Sveučilište u Rijeci • University of Rijeka
Trg braće Mažuranića 10 • 51 000 Rijeka • Croatia
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3.2. Course description

Generic information		
Head of Course	Irena Jurdana	
Course	Electrical Measurement and Instrumentation	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	bachelor	
Type of Course	mandatory	
Year of Study	1.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquisition of knowledge on electrical engineering, measurement methods and measuring instrumentation. Ability to independently measure basic electrotechnical values according to the STCW Convention.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

1. Describe the measurements of physical values and the measurement result
2. Compare electrical measuring instruments with digital instruments
3. Analyse resistance, capacity and inductance measurements
4. Interpret voltage and current range extensions
5. Apply digital measuring instruments
6. Describe the principle of operation of the oscilloscope and basic measurements
7. Understand non-electric measurements
8. Analyse remote measurements and measurement systems

1.4. Course Outline

Measurement of basic physical values. Expression of the measurement results. Electronic measurement instruments. The use of measurement instruments. Measurement systems in ship and maritime industry applications. Measurement of electrical current, voltage and impedance. Measurement of electrical power and energy. Electrical current and voltage sources. Measuring parameters of the electric signal in the time domain and frequency domain. Measurements on optical fibers. Remote measurements. Measurement of non-electrical quantities.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Regular attendance to lectures, to 1st and 2nd mid-term exam, presentation of exercises in the practical work session, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation	0,5	Seminar paper		Experiment	
Written exam	1	Oral exam	1	Essay		Research	
Project		Continuous Assessment	0,5	Presentation		Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating acquired learning outcomes is based on the regulation on University of Rijeka Studies and the regulation on Studying at the Faculty of Maritime Studies in Rijeka as follows:

• Through continuous assessment of knowledge during the course, 70% of the learning outcomes gained through the 1st mid-term exam - learning outcomes 1-4 (25%), 2nd mid-term exam - learning outcomes 5-8 (25%) are valued, including presentation of the practical task - learning outcomes 1-8 (10% in each mid-term exam); the student must achieve at least 50% points for each mid-term exam.

• 30% of the learning outcomes (1-8) are evaluated in the final part of the exam (oral), with the student passing the final exam at least 50% of the points.

Examples of learning outcomes in relation to the set learning outcomes are:

1. Define the basic measured size, understand the international measurement system, distinguish physical size measurements, and show examples of measurement results.
2. Define and explain the parameters of comparison of electrical measuring instruments with digital instruments.
3. Identify and interpret different measurement methods of resistance, capacity and inductance.
4. Explain the extension of the voltage and current metering range.
5. Apply digital measuring instruments for basic measurements and display measurement results in graphic and numeric form.
6. Understand the use and functions of the oscilloscope basic measurements.
7. Explain the application of measurements on fiber optics and comment on the advantages and disadvantages of such application.
8. Describe and explain the frequency measurements and measure the basic signal characteristics.
9. Summarise describing measurement methods, and application in maritime industry measurement of non-electric values.
10. Explain the use of remote sensing systems.

1.10. Main Reading

1. V. Bego, Mjerenja u elektrotehnici, Graphis, Zagreb, 2003.
2. D. Vujević, B. Ferković, Osnove elektrotehničkih mjerenja, I. i II. dio, Školska knjiga, Zagreb, 2001.
3. F. Mlakar, Električna mjerenja, Tehnička knjiga, Zagreb, 2003.
4. G.P. Agrawal: Fiber-Optic Communication Systems, John Wiley, 2010.
5. J.P.Dakin, Handbook of Optoelectronics, Taylor&Francis Group, 2006.
6. Reading material available on e – learning system - Merlin - (https://moodle.srce.hr)

1.11. Recommended Reading

1. A. Šantić, Elektronička instrumentacija, 3. izdanje, Školska knjiga, Zagreb, 1993.
2. C. F. Combs, (ed.), Electronic Instrument Handbook, 3rd ed, McGraw-Hill, New York, 1999
3. Reading material available on e – learning system - Merlin (https://moodle.srce.hr)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
V. Bego, Mjerenja u elektrotehnici, Graphis, Zagreb, 2003.	6	70
D. Vujević, B. Ferković, Osnove elektrotehničkih mjerenja, I. i II. dio, Školska knjiga, Zagreb, 2001.	4	70

Reading material available on e – learning system - Merlin (https://moodle.srce.hr)	-	70

1.13. Quality Assurance

The quality of the study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once in semester is conducted by anonymous student evaluation of teaching.

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3.2. Course description

Generic information		
Head of Course	Dr.sc. Aleksandar Cuculić	
Course	Laboratory and Skills	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate	
Type of Course	Mandatory	
Year of Study	1	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	0+3+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Main course objectives are development of basic knowledge and skills with respect to programming, modelling and simulation in computer programs like MATLAB, Simulink, Multisim, Arduino as well as introduction with equipment in Laboratory for Process Measurements and Laboratory for Guidance and Control

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

After successfully finishing this course, students will be able to:

1. Demonstrate how to measure circuits using the equipment in Laboratory for Process Measurements and Laboratory for Guidance and Control
2. List elements of NI Multisim program
3. Use NI Multisim to solve basic engineering problems
4. List and interpret elements of computer tools for programming and simulation such as MATLAB and Simulink
5. Use MATLAB and Simulink to solve basic engineering problems
6. List physical and programming elements of Arduino system
7. Apply Arduino as a tool for data aquisition

1.4. Course Outline

Introduction to laboratory equipment. Introduction to Multisim. Structure and components of Multisim software. Development and analysis of basic circuits in Multisim software. Introduction to MATLAB. Structure and components of MATLAB software. Basic mathematical operations in MATLAB software. Operators and functions as basic programming components in MATLAB. Graphical visualization of curves and surfaces in MATLAB. Use of MATLAB as a tool to solve chosen problems in applied engineering. Introduction to Simulink. Comparison of data acquired by data acquisition procedures with simulated data. Introduction to Arduino. Structure and components of Arduino circuitry and IDE. Programming Arduino microcontroller within Arduino IDE, MATLAB and Simulink.

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1.5. Modes of Instruction	☐ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	None	

1.7. Student Obligations

1st semesterly exam, 2nd semesterly exam, 3rd semesterly exam, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation	0,5	Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Expected learning outcomes are evaluated by the rules stated in following documents:
Pravilnik o studijima Sveučilišta u Rijeci
Pravilnik o studiranju na Pomorskom fakultetu u Rijeci

According to above documents:

- *70% of expected learning outcomes is evaluated by continuous assessment over the semester;*
  1st semesterly exam – expected learning outcomes 1-3 (20%)
  2nd semesterly exam – expected learning outcomes 4-5 (20%)
  3rd semesterly exam – expected learning outcomes 6-7 (20%)
  Class participation and course attendance (10%)
- *30% of expected learning outcomes is evaluated by the results of final exam ; 1-7*
  Here, student has to realize at least 50% of the total final exam score

Examples of evaluating expected learning outcomes are given below:

1. *Measure voltage and current in the circuit using NI MyDAQ device*
2. *Separate NI Multisim symbols according to the group and family*
3. *Complete simulation model according to the provided schematic and determine circuit primary current and voltage values*
4. *List elements of MATLAB/Simulink software*
5. *Use matrix mathematics to solve system of linear equations*
6. *List power sources that can be used to power Arduino device*
7. *Measure and log data about temperature and light intensity in the room*

1.10. Main Reading

Cuculić, A. (2019).Laboratory and Skills, Authorized materials, University of Rijeka, Faculty of Maritime Studies, Rijeka, Croatia.
Course material available on e-learning portal - Merlin (https://moodle.srce.hr)

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.11. Recommended Reading

Ban, Ž., Matuško, J., Petrović, I. (2010). Primjena programskog sustava Matlab za rješavanje tehničkih problema. Graphis, Zagreb, Hrvatska.
Moore, H. (2015). MATLAB for Engineers. Pearson Education Inc, England.
The MathWorks (2016). MATLAB & Simulink Help Documentation. Available online: http://uk.mathworks.com/help/index.html
National Instruments (2009). NI Multisim User Manual. Available online:
http://www.ni.com/pdf/manuals/374483d.pdf

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Cuculić, A. (2019).Laboratory and Skills, Authorized materials, University of Rijeka, Faculty of Maritime Studies, Rijeka, Croatia.	-	100
Course material available on e-learning portal - Merlin (https://moodle.srce.hr)	-	

1.13. Quality Assurance

Quality is monitored by University of Rijeka, Faculty of Maritime Studies, according to ISO 9001 standard

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3.2. Course description

Generic information		
Head of Course	Damir Zec, Ph.D.	
Course	Safety at Sea	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate	
Type of Course	Elective	
Year of Study	2	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	45 + 15 + 0 (3 + 1 + 0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to familiarize students with the international navigation safety system, including the most important maritime conventions and to enable them to perform basic maritime safety tasks independently, including search and rescue at sea, emergency communications, survival at sea and firefighting, in accordance with the provisions of the STCW Convention. Through practical work and exercises, students need to acquire skills required in case of different emergencies, especially in case of on-board fire, vessel abandon, survival at sea and communication using the GMDSS equipment.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

Students are expected to be able to:

1. enumerate and interpret the legal sources of the international and national safety system,
2. control the ship safely,
3. perform basic search and rescue operations at sea,
4. use means of communication in case of emergency,
5. prepare to abandon the ship and use safety crafts and means available on board the ships,
6. recommend survival methods after the ship's abandon,
7. explain the functional characteristics, technological conditions and the way of maintaining fire-fighting devices on ships,
8. use fire-fighting means available on merchant ships.

1.4. Course Outline

International and national maritime safety system, search and rescue at sea, maritime accidents, life-saving means, communications while assisting in danger, leaving the ship and surviving at sea, people at sea, fire protection, maintenance and surveillance of all safety systems on board, development and preparing an emergency plan and organizing and conducting exercises on board.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments	

1.7. Student Obligations

Active participation and at least 70% of class attendance.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2.0	Class participation		Seminar paper		Experiment	
Written exam	1.0	Oral exam	1.0	Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	1.0
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

1. 70% in class and 30% in final exam (according to the Regulations on studies of the University of Rijeka and the Regulations on study at the Faculty of Maritime Studies in Rijeka)
2. Practical work - on a training ground (practicum, firefighting field) (outcomes 2,3,4,5,8)
3. Written exam in the field of International Maritime Safety, Search and Rescue at Sea, Maritime Accidents, Life-Saving, Communication during Assistance, Ship's abandon, Survival and Fire Protection (minimum 75% correct answers required, all learning outcomes)
4. Oral exam - the completeness of theoretical knowledge in the field of safety at sea is checked (minimum 50% of the required theoretical knowledge is required)

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Sort out ways to help people at sea by type of threat.
2. List the maritime communication channels and explain the advantages and disadvantages of each frequency band.
3. Explain the ship's abandon procedure.
4. List and explain how the ship's firefighting systems work.
5. Explain and prepare a muster list.

1.10. Main Reading

1. Zec, D., "Sigurnost na moru", izdanje 2001.

1.11. Recommended Reading

1. International Maritime Organization, SOLAS, London, 2009.
2. International Maritime Organization, SAR, London, 2003.
3. International Maritime Organization, IAMSAR, Vol. 1, Vol. 2, Vol. 3, 2006.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Zec, D. Safety at sea	11)	60

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the failure to pass are analysed and appropriate measures are adopted.

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Marko Gulić		
Course	Advanced programming		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate degree programme		
Type of Course	Elective		
Year of Study	1st		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The course provides a basic understanding of programming approaches, concepts, and procedures and introduces the modular design of programs. The course covers topics related to algorithm development and execution procedures, the use of language constructs in simple program code, and program error correction procedures. The course introduces students to commonly used algorithms using C ++.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:
1. Apply the basic principles of program design
2. Develop and write a simple program as well as understand and eliminate errors that the compiler returns
3. Develop algorithms using programming language constructs to control program flow
4. Describe the use cases of a particular program flow control using a suitable algorithm example
5. Write a program that uses an array to store data
6. Extract the parts of the given algorithm and create them within the function
7. Write a program that uses one or more data structures
8. Write a program that uses simpler storage files

1.4. Course Outline

Fundamentals of the C++ programming language (variables and assignment, input and output, data types and expressions, and search for errors in a written program). The program run control commands (IF-ELSE command, nested IF command, extended IF-ELSE command using ELSE IF block, and SWITCH command. WHILE, DO-WHILE and FOR loops). Arrays. Structures. String. Functions (functions that return value and functions of type void). Passing values by reference. Files.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☒ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments	Teaching is carried out by combining classroom work and individual work in the computer lab. Students will be instructed to use the distance learning system when enrolling in the course. A detailed schedule of lectures and exercises will be published in the implementation plan.

1.7. Student Obligations

- Regularly attend classes (lectures and exercises) and take short tests at the beginning of each exercise
- Write 1st and 2nd intermediate exam (colloquium)
- Pass the final (oral) exam if the criteria for admission are met.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experim ent	
Written exam		Oral exam	1.5	Essay		Researc	
Project		Continuous Assessment	1.5	Presentation		Practical	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Rulebook on Studies at the Faculty of Maritime Studies in Rijeka as follows:

- 70% of the acquired learning outcomes are evaluated through continuous knowledge assessment during the teaching process: through the 1st intermediate exam (colloquium) - learning outcomes 1-3 (30%), 2nd intermediate exam (colloquium) - learning outcomes 5-8 (30%), weekly short tests before exercises - learning outcomes 1-8 (10%); a student must have completed a minimum of 50% points in each intermediate exam (colloquium)
- 30% of the acquired learning outcomes (1, 3-8) are evaluated at the final (oral) part of the exam, with a minimum of 50% of available points necessary for passing the final exam.

Examples of evaluating learning outcomes respecting set learning outcomes are:

1. Design and write the basic parts of the algorithm for calculating the surface of the square in the programming language
2. Identify the errors within the entered algorithm for calculating the surface of the squares and correct them
3. Design and write an algorithm in programming language that tests whether the number entered is positive, negative, or zero
4. Describe the case of using the DO-WHILE loop on the appropriate algorithm example
5. Design and write a program that loads 20 numbers and displays only entered numbers greater than the arithmetic mean of all entered numbers.
6. Design and write a function to calculate the factorial of a given number sent from the main program
7. Design and write a program that stores student information (first name, last name, JBMAG and average grade) within the structure. Furthermore, the program should print data only for those students whose average grade is less than 2.5
8. Design and write a program that saves all entered student records within the program into a text file.

1.10. Main Reading

- Julijan Šribar, Boris Motik: Demistificirani C++, Dobro upoznajte protivnika da biste njime ovladali, Element, Zagreb, 2001.
- E-course teaching materials available on the Merlin e-learning system (https://moodle.srce.hr)

[1] **NOTE**: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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1.11. Recommended Reading

- Stanley B. Lippman, Josée Lajoie, Barbara E. Moo: C++ Primer, 5th Edition, Addison-Wesley Professional, *2013*
- Vulin, R.: Zbirka riješenih zadataka iz C-a, Školska knjiga, Zagreb, 2003.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Julijan Šribar, Boris Motik: Demistificirani C++	2	80
E-course teaching materials available on the Merlin e-learning system	-	80

1.13. Quality Assurance

The quality of study is continuously observed under the ISO 9001 system and following European standards and guidelines for quality assurance implemented at the Faculty of Maritime Studies, University of Rijeka. An analysis of the exams is given annually, and a survey among students is conducted by the semester.

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Table 2.

3.2. Course description

Generic information			
Head of Course	Boris Svilicic		
Course	Electronic Devices and Circuits		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Obligatory		
Year of Study	2nd	Semester	3rd
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		4+2

1. GENERAL COURSE DESCRIPTION		
1.1. Course Objectives		
Gaining knowledge on basic working principles of solid-state electronic devices and analog electronic circuits.		
1.2. Prerequisites for Course Registration		
Completed course "Fundamentals of Electrotechnic".		
1.3. Expected Learning Outcomes		
1. Fundamentals of the physical theory of semiconductor materials. 2. Working principles of diodes. 3. Working principles of bipolar transistors. 4. Working principles of unipolar transistors. 5. Working principles of amplifiers based on bipolar transistors. 6. Working principles of amplifiers based on unipolar transistors. 7. Working principles of amplifier cascades. 8. Working principles of differential amplifier. 9. Working principles of circuits with the feedback. 10. Analysis of dynamic characteristics of electronic circuits. 11. Working principles of power amplifiers. 12. Working principles of the operational amplifier. 13. Working principles of amplifiers based on the operational amplifier.		
1.4. Course Outline		
Fundamentals of the physical theory of semiconductor materials. Diodes. Bipolar transistors. Unipolar transistors. Amplifiers based on bipolar transistors. Amplifiers based on unipolar transistors. Amplifier cascades. Differential amplifier. Circuits with the feedback. Power amplifiers. Operational amplifier. Amplifiers based on the operational amplifier.		
1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises	☐ Practical work ☐ Multimedia and Network ☒ Laboratory

	☐ E-learning ☐ Field work	☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular class attendance (all students are expected to abide by the class attendance policy set forth by the Faculty of Maritime Studies), and passed course work (achievement tests pass grade). A min of 35 credits.

1.8. Assessment of Learning Outcomes

Course attendance	1.5	Class participation	1	Seminar paper		Experiment	
Written exam	1	Oral exam	1.5	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Assessment of learning outcomes:

- During the classes by collecting 70 credits through the first colloquium (learning outcomes 1.3.1 - 1.3.8, in total 27 credits), second colloquium (learning outcomes 1.3.8 - 1.3.13, in total 27 credits), laboratory work (learning outcomes 1.3.1 - 1.3.13, in total 16 credits);
- On the final exam by collecting additional 30 credits.

Examples of Evaluation:

1. Explain working principles of the diode.
2. Explain working principles of the bipolar transistor.
3. Explain working principles of the unipolar transistor.
4. Explain working principles of the amplifiers based on bipolar transistors.
5. Explain working principles of the circuit with the negative feedback.
6. Explain working principles of the differential amplifier.
7. Explain working principles of the power amplifier class B.
8. Explain working principles of the operational amplifier.
9. Explain working principles of the integrating amplifier.

1.1. Main Reading

Lecture materials.

1.2. Recommended Reading

Horowits and Hill, The Art of Electronics, Cambridge University Press, 2001

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Lecture materials	web	78
Horowits and Hill, The Art of Electronics, Cambridge University Press, 2001	1	78

1.4. Quality Assurance

Internal: student feedback at the end of academic year and the course review by the head of course at the end of academic year.
External: Program quality review carried by the QA Agency.

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3.2. Course description

Generic information			
Head of Course	Dubravko Vučetić		
Course	Marine electrical machines		
Study Programme	MARINE ELECTRONIC ENGINEERING AND INFORMATION TECHNOLOGY		
Level	Undergraduate		
Type of Course	Core		
Year of Study	2		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of this course is to provide knowledge of marine electrical machines prescribed by STCW and IMO Model Course - Electro-Technical Officer

1.2. Prerequisites for Course Registration

Passed Courses: Fundamentals of Electrical Engineering I and Fundamentals of Electrical Engineering II

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:
1. Explain the operating principles of marine electrical machines.
2. Describe the operating characteristics of marine electrical machines.
3. Carry out testing of marine electrical machines
4. List and explain the maintenance of marine electrical machinery
5. Explain the relay schematics of induction motor starters

1.4. Course Outline

Fundamentals of Electrical Machines. Transformers. Induction motors. DC machines. Synchronous machines. Starters. Electric motor drives. Testing. Maintenance.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular attendance at classes, regular midterm exams, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	0.9	Essay		Research	
Project		Continuous Assessment	1.6	Presentation		Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Learning outcomes are evaluated through regular class attendance and activity (10%), continuous partial exams (60%) and final examination (30%). During the class, the student can collect a maximum of 70% of the points as follows:
A) Successfully pass 2 oral partial exams within the prescribed deadlines. Each passed partial exam carries a minimum of 15% and the maximum of 30%. A student who has not achieved all the required learning outcomes cannot pass the partial exam. The following partial exam cannot be accessed unless the previous is passed. The partial exams include:
1st partial exam: Transformers and Electromagnetism Fundamentals (Learning Outcomes 1-5)
2nd partial exam: Induction and DC Machines (Learning Outcomes 1-5)
B) Active attendance (lectures and exercises). Each class absence accounts as -1% of the point.
Students who pass two partial exams can apply for the final oral exam (Synchronous Machines (Learning Outcomes 1-5) and earn a minimum of 15% and a maximum of 30% of the points.

Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. Explain the principle of operation of an induction motor.
2. Describe the operating diagram of the diesel generator.
3. Conduct a three-phase transformer test.
4. List and explain the maintenance procedures for the collector motor.
5. Explain the operation of the star – delta starter

1.10. Main Reading

D.Vučetić, Brodski električni strojevi i sustavi, Pomorski fakultet u Rijeci, 2012. web edition

1.11. Recommended Reading

B.Skalicki, J.Grilec, Električni strojevi i pogoni , Fakultet strojarstva i brodogradnje, Zagreb 2005.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
D.Vučetić, Brodski električni strojevi i sustavi, Pomorski fakultet u Rijeci, 2012.	web	

1.13. Quality Assurance

Quality assurance is based on Faculty ISO 9001 system.

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Generic information			
Head of Course	Vinko Tomas		
Course	Basics in automation		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate degree programme		
Type of Course	Compulsory course		
Year of Study	2 years		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5	
	Number of Hours (L+E+S)	30+30+0	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are to gain knowledge in the fields of automation, the principles of automatic control and automatic regulation, as well as understanding the manner in which the measuring, actuating and regulating members and their elements operate.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. Distinguish between the principles of automatic control and automatic regulation
2. Explain the basic requirements of automation
3. Calculate the transfer function for the regulation control circuit
4. Distinguish between types of automation elements and their basic characteristics
5. Apply standard techniques for adjusting the regulators
6. Calibrate the measuring sensors (temperature, pressure, level)
7. Explain the basic principles of operation of different regulator designs
8. distinguish between automatic control systems (depending on the way of functioning and the way of forming executive action on the object)

1.4. Course Outline

Areas of automation, principles of describing automation objects. Signaling. Energies/media in automation and energy selection factors. Defining the transient and transfer function and principles of calculating the transfer function for various complex structures. Features of automatic regulation, automatic control and automatic process control. Principles and techniques of automatic regulation. The structure of the automatic control system. Basic components of regulation and control systems (measuring members, comparators, control devices, actuators, ...). Calibration of measuring sensors. Regulator performances. Divisions of regulation.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____

1.6. Comments	

1.7. Student Obligations

1st colloquium, 2nd colloquium, design and presentation of a research assignment in an hour of exercises, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper	0,5	Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out in accordance with the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka as follows:

- through continuous assessment of knowledge during class 70% of the acquired learning outcomes are assessed. Those include: 1st semester exam (midterm) - learning outcomes 1-4 (25%), 2nd semester exam (midterm) - learning outcomes 5-8 (25%), presentation of the research assignment (seminars) - learning outcomes 1-8 (20%); the student must score at least 50% of points in each midterm, while the presentation of the research assignment is evaluated on the basis of elaborated evaluation criteria;
- 30% of the obtained learning outcomes (1-8) are evaluated at the final exam, with the student having to complete at least 50% of points for passing the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Draw a block diagram of the regulation circuit, mark the regulation members, elements and sizes in the regulation circuit
2. When and how to apply PD controller
3. Calculate the transfer function for the given regulation circuit
4. Principle of operation and properties of electromagnetic setup drives
5. Describe the setting of the regulation action for the PID controller (Zeigler-Nichols method)
6. Calibration of pressure sensors
7. How to adjust the actions of an electronic controller with differential amplifier
8. Explain the basic structure, mode of operation of the servo system and what is the difference with respect to program regulation

1.10. Main Reading

1. V. Tomas, I. Šegulja, M. Valčić, Osnove automatizacije, Pomorski fakultet, Sveučilište u Rijeci, 2010.
2. E-course syllabus available on the e-learning system - Merlin

1.11. Recommended Reading

1. T. Šurina, Automatska regulacija, Školska knjiga, Zagreb, 1987.
2. C.A.Smith and A.B.Corripio, Principles and Practice of Automatic Process Control, John Wiley&Sons,Inc., New York 1997.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Tomas, I. Šegulja, M. Valčić, Osnove automatizacije, Pomorski fakultet, Sveučilište u Rijeci, 2010.	55	55
E-course syllabus available on the e-learning system - Merlin	-	55

1.13. Quality Assurance

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Quality assurance is based on Faculty ISO 9001 system. Yearly analyze is produced based on quantitative student examination data, and qualitative based on student survey derived at the end of each semester.

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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3.2. Course description

Generic information		
Head of Course	Predrag Kralj, Associate Professor, Ph.D., MS.ME., BS.ME.	
Course	Marine Propulsion Systems	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate	
Type of Course	Elective	
Year of Study	2	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	30+30+0 (2+2+0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to give the students basic knowledge on ship power plant, piping systems and systems of remote operation and protection and other auxiliary systems that are important for the safety of sea transport.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

It is expected that the student will be able:
1. to interpret correctly basic marine engineering terms
2. to explain basics of propulsion engine's operation and to apply knowledge on engine room model (simulator)
3. to analyze types and characteristics of marine auxiliary systems
4. to perform assessment and maintenance of marine systems in electrical officer domain

1.4. Course Outline

Basic knowledge on marine technical terms (7.01:1.10.3.); ship propulsion plants –7.01: 1.10.1. (diesel-engine plants, steam-turbine plants, gas- turbine plants, combined plants);
Ship piping, piping elements, materials and protection, international regulation on ship systems, propulsion systems (fuel system, lubrication oil system, starting air system (7.02:1.2.1.8.); cooling water system (7.02:1.2.1.6., 1.2.2.11.-13.), steam and condensate system); general purpose system and safety systems (ballast –7.02: 1.3.1.1., bilge – 7.02:1.3.1.2., firefighting systems –7.02:1.3.1.3., ventilation, service air and control air systems (7.02:1.2.3.5.); system's exploitation, local and remote operation, and environment protection –7.02: 1.3.1.4.-5.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Active participation on classes and at least 70% of presence on lessons.
Passed partial exams and successful demonstration of power plant managing skills on the engine room simulator through group type practical exams, preparing the students for their future working environment.
Passed final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	0,5	Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	0,5
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% during classes (two theoretical and two practical partial exams – outcomes 1 - 4) and 30% on final exam (learning outcomes 1 - 4) in accordance with the University's and Faculty's normative acts. Continuous assessment:

- Two theoretical partial exams on marine engineering (diesel-engine power plants, steam generators and turbines, auxiliary equipment, piping) (45%) – outcomes 1 – 4
- Two partial exams on engine room simulator where skill of marine engines and equipment operations is assessed (25%) – outcomes 1 – 4

On written final exam complete field of marine engineering is assessed (outcomes 1 – 4).
Examples of assessment for outcome:

1. Point main parameters on the diagram of the heat process (outcome 2)
2. List main construction elements of the diesel engine (outcomes 1, 2)
3. Demonstrate the knowledge of auxiliary system and basic methods for its evaluation (outcomes 3, 4)

1.10. Main Reading

1. Kralj Predrag, Marine energy systems, web publication
2. Martinović Dragan*, Brodski strojni sustavi, Rijeka, 2005.*
3. Dragan Martinović: Strojarski priručnik za časnike palube, Graftrade, Rijeka, 2005.
4. Matković Milan, Protupožarna zaštita na brodovima, Pomorski fakultet, Rijeka, 1995.
5. Learning materials published on the lecturer's web page and on the e-learning system Merlin

1.11. Recommended Reading

Ozretić Velimir, Brodski pomoćni strojevi i uređaji, Ship management, Split, 1996..

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Marine energy systems	web	40
Lecturer's Learning materials	web	
Brodski strojni sustavi	Bibliothek 6	
Strojarski priručnik za časnike palube	Bibliothek 6	
Protupožarna zaštita na brodovima	Bibliothek 6 Faculty Book Store	

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

	500	

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

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3.2. Course description

Generic information		
Head of Course	Irena Jurdana	
Course	Computer network and protocols	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	bachelor	
Type of Course	elective	
Year of Study	2.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of this course is to acquire knowledge from the subject matter prescribed by the STCW Convention in the area of data transfer and computer networks. Special attention is paid to the understanding of local communication and computer networks and the application and maintenance of SW and HW local networks on ships.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

1. Describe the model of the communication system and information network model
2. Explain the data processing systems
3. Describe the types and application of codes, analyse coding methods and line codes
4. Understand the information network architecture
5. Describe LAN, WLAN and VLAN
6. Analyse access technology on the Internet Network
7. List and compare the OSI model, TCP / IP and Internet, Ethernet and NMEA protocols
8. Understand and explain the automatic telephone system on board

1.4. Course Outline

History of digital communication. Introduction to computer networks, communication models, data transfer, types and applications of computer networks, network standards, the OSI architecture, the architecture of the Internet, transmission media, local area networks, TCP / IP model, NMEA protocol, data protection, monitoring and network management. Automatic telephone system on board.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Regular attendance to lectures, to 1st and 2nd mid-term exam, presentation of exercises in the practical work session, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam	0,5	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating acquired learning outcomes is based on the regulation on University of Rijeka Studies and the regulation on Studying at the Faculty of Maritime Studies in Rijeka as follows:

• Through continuous assessment of knowledge during the course, 70% of the learning outcomes gained through the 1st mid-term exam - learning outcomes 1-4 (25%), 2nd mid-term exam - learning outcomes 5-8 (25%) are valued, including presentation of the practical task - learning outcomes 1-8 (10% in each mid-term exam); the student must achieve at least 50% points for each mid-term exam.

• 30% of the learning outcomes (1-8) are evaluated in the final part of the exam (oral), with the student passing the final exam at least 50% of the points.

Examples of learning outcomes in relation to the set learning outcomes are:

1. Define and properly interpret and graphically show the communication system model
2. Explain the advantages and disadvantages of analogue and digital communications
3. Define the information network and specify the application of such networks in maritime industry
4. Explain and describe the work principle of the data processing system
5. Summarise the types and application of codes, analyse coding methods and line codes
6. Understand the information network architecture
7. Compare and find the similarities of LAN, WLAN and VLAN
8. Analyse Access Technology on the Internet Network
9. Explain the application and compare OSI model, TCP / IP and Internet, Ethernet and NMEA protocols
10. Explain the application and operation of the automatic telephone system on board.

1.10. Main Reading

1. Turk S.: Računarske mreže, Školska knjiga, Zagreb, 1991.
2. Bažant A. i ost., Osnovne arhitekture mreža, Element, Zagreb, 2004.
3. Pandžić I.S. i ost., Uvod u teoriju informacije i kodiranje, Element, Zagreb, 2007.
4. Srbljić S.: Uvod u teoriju računarstva, Element, Zagreb, 2007.
5. Reading material available on e – learning system - Merlin - (https://moodle.srce.hr)

1.11. Recommended Reading

1. Duck M., Read R.: Communication and Computer Networks, Pearson Education Limited, 2003.
2. Bažant A. i ost., Telekomunikacije-tehnologija i tržište, Element, Zagreb, 2007.
3. Reading material available on e – learning system - Merlin (https://moodle.srce.hr)

1.12. Number of Main Reading Examples

Title	Number of examples	Number of students
Turk S.: Računarske mreže, Školska knjiga, Zagreb, 1991.	4	55
Bažant A. i ost., Osnovne arhitekture mreža, Element, Zagreb, 2004.	4	55
Pandžić I.S. i ost., Uvod u teoriju informacije i kodiranje, Element, Zagreb, 2007.	4	55
Srbljić S.: Uvod u teoriju računarstva, Element, Zagreb, 2007.	2	55
Reading material available on e – learning system - Merlin (https://moodle.srce.hr)	-	55

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1.13. Quality Assurance

The quality of the study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once in semester is conducted by anonymous student evaluation of teaching.

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3.2. Course description

Generic information		
Head of Course	Ph.D. Jasmin Ćelić, assistant professor	
Course	Databases	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate degree programme	
Type of Course	Elective course	
Year of Study	2.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Introducing students to the basic concepts of database theory with an emphasis on relational databases.

1.2. Prerequisites for Course Registration

There are no prerequisites.

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. define basic database concepts
2. describe the basic elements of a database management system
3. create relational data models based on user requirements
4. use relational algebra and SQL queries in solving practical problems
5. recognize the normal form of a relational database
6. solve problems using system and aggregate functions and grouping

1.4. Course Outline

Introduction to databases. Database concepts. Relational data model. Relational algebra. Operations in the relational model. Non-procedural languages for working with a relational database - SQL. Integrity rules in a relational data model. The notion of zero-value and incomplete information. Elements of dependencies theory. Normalization, normal forms. Temporal databases. Transactions, triggers and stored procedures. Introduction to object-relational databases. Fundamentals of physical organization, indexes, B-tree, R-tree.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

1st colloquium, 2nd colloquium, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation	0.5	Seminar paper		Experiment	
Written exam	1	Oral exam	0.5	Essay		Research	
Project		Continuous Assessment	0.5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- *70% of acquired learning outcomes are evaluated through continuous testing of knowledge during classes:*

  through the 1st colloquium - learning outcomes 1.-3. (35%), 2nd colloquium - learning outcomes 4.-6. (35%); in doing so, the student must realize a minimum of 50% of points for each colloquium;
- *at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-6), whereby the student must realize a minimum of 50% of points to pass the final exam;*
- *final ECTS grade, is defined on the basis of the achieved total % of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:*
  - *the grade excellent (5) corresponds to the grade A in the ECTS scale and the success rate from 90 to 100%,*
  - *a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,*
  - *grade good (3) corresponds to grade C on the ECTS scale and a success rate of 60 to 74.9%,*
  - *a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,*
  - *the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.*

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. What is a database? (IU #1)
2. What are the most important tasks of a database management system? (IU #2)

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

3. What is an involute relationship? (IU #3)
4. Write an expression to create the relation named *Destination* shown in the figure below.

Naziv broda	Nosivost	Naziv kompanije	mbr	Odredišna luka
Kobayashi Maru	25200	Croatia line	3032012	Beira
Al-Batani	42800	Tankerska plovidba	2022012	Kalamata
Peterson	13500	Tankerska plovidba	2022012	Dalian
Gettysburg	28000	Lošinjplov	1012012	Tripoli
Chang Zhau	36450	Croatia line	3032012	Georgetown

(IU #4)

5. When can a relation be said to be in 2NF? (IU #5)
6. If the code below applies to the displayed relationship called Exams, draw a relationship that will show the result. (IU #6)

```
SELECT nazPred
, akGod
, AVG(ocjena) AS prosjOcj
, MAX(ocjena) AS maxOcj
FROM ispiti
GROUP BY nazPred, akGod;
```

mbrStud	akGod	nazPred	ocjena
100	2012	Baze podataka	3
101	2012	Baze podataka	5
102	2012	Baze podataka	2
103	2009	Baze podataka	3
100	2014	Algoritmi	5
101	2009	Algoritmi	5
102	2009	Algoritmi	2
100	2012	Matematika	4

1.10. Main Reading

- Manger, R. (2014.). Baze podataka, Element, Zagreb, Hrvatska
- Maleković, M., Schatten, M. (2017.). Teorija i primjena baza podataka, Fakultet organizacije i informatike, Varaždin, Hrvatska

1.11. Recommended Reading

- Radovan, M. (1993.). Baza podataka - relacijski pristup i SQL, Informator, Zagreb, Hrvatska
- Pavlić, M. (2011.). Oblikovanje baza podataka, Odjel za informatiku Sveučilišta u Rijeci, Rijeka, Hrvatska
- Price, J. (2014.). Oracle Database 12c SQL, McGraw-Hill, USA

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Manger, R. (2014.). Baze podataka, Element , Zagreb, Hrvatska	*5*	*50*

1.13. Quality Assurance

The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once a semester a survey is conducted among students.

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3.2. Course description

Generic information			
Head of Course	Aleksandar Cuculić, Assistant professor		
Course	Marine electrical systems		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Compulsory		
Year of Study	II		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		3+2

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of this course is to provide the student with relevant knowledge of marine electrical systems as prescribed by STCW and IMO Model Courses for the service of marine electro technical officers (ETO)

1.2. Prerequisites for Course Registration

Completed courses: Electrical Engineering Fundamentals I and II, Electrical Measurements and Instrumentation and Marine Electrical Machines

1.3. Expected Learning Outcomes

1. Explain the importance and role of the ship's electrical power system, basic concepts related to the ship's electrical systems, the impact of environmental conditions on electrical appliances, and the rules of classification societies.
2. Define and Calculate the basic electrical parameters of the ship's power system: power balance, short-circuit current, line voltage and frequency, number and power of installed generators.
3. Understand the design concepts and operating principles of main and emergency power sources, the diesel generator capability chart, and the operation of the speed controller and the automatic voltage regulator.
4. Know the procedures of synchronization of the generator to the grid, load sharing between generators working in parallel and connecting the ship system to shore supply (cold ironing).
5. Understand the power distribution system on board, design and components of main and emergency switchboards and ship’s cable network.
6. Understand operation principles of power switching devices used in marine power systems (circuit breaker, switch, disconnector, contactors, relays, ...) and operation of electrical protections, safety relays and selective short-circuit protection systems.
7. Know the design and operation principles of marine electric motor drives (pumps, compressors, winches, deck machines), methods of controlling electric motor drives, marine electric lighting, cathodic protection systems, cooling systems and refrigeration containers and marine electrical devices in explosion-proof version.
8. Understand the dangers, safety procedures and technical precautions for work on electrical systems and be able to read the electrical diagrams and technical documentation.

1.4. Course Outline

Environmental conditions. Rules and regulations. Safety. Electric power systems of marine vessels. Production of electricity. Electrical power distribution. Cables. Batteries. Switchgear. Lighting. Electrical protections. Marine electric motor drives. Cathodic protection. Refrigeration. Explosion-proof versions of the device.

Maintenance. Technical documentation..

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular follow-up of classes (lectures and exercises), continuous assessment, and passing the oral final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	2,5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka as follows:

• 70% of the acquired learning outcomes through the continuous assessment 1st mid-term exam - through learning outcomes 1-3 (23%), 2nd mid-term exam - through learning outcomes 4-6 (24%), 3rd mid-term exam - through learning outcomes 7-8 (23%); the student must have completed at least 50% of points in each mid-term exam.

• 30% of the acquired learning outcomes (1-8) are evaluated in the final part of the exam, with a minimum of 50% credit for passing the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Explain the diesel generator power capability curves.
2. Calculate short circuit current for 1000 VA synchronous generator with nominal voltage of 440 V, sub transient reactance Xd''=12% and 2mΩ stator resistance.
3. Describe the procedure for synchronizing the generator to the network.
4. Explain the role of the speed controller in the distribution of active power between generators connected in parallel.
5. List the generator electrical protections and their settings.
6. Explain the working principle of cathodic protection system.
7. Describe working principles and correct way of EXi electrical equipment.

1.10. Main Reading

Teaching materials on the Merlin e-learning system (https://moodle.srce.hr)

1.11. Recommended Reading

Hall, Dennis T. Practical marine electrical knowledge. Witherby Seamanship International,2014.

1.12. Number of Main Reading Examples

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

Title	*Number of examples*	*Number of students*
Teaching materials on the Merlin e-learning system	Available on Web	50
Hall, Dennis T. Practical marine electrical knowledge. Witherby Seamanship International, 2014.	3	50

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analysed and appropriate measures are adopted.

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Table 2.

3.2. Course description

Generic information			
Head of Course	Boris Svilicic		
Course	Digital Electronics		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Obligatory		
Year of Study	2nd	Semester	4th
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		3+2

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Gaining knowledge on basic working principles of digital electronic circuits for data memorizing and processing.

1.2. Prerequisites for Course Registration

Completed course "Fundamentals of Electrotechnic".

1.3. Expected Learning Outcomes

1. Terms definition and application of the basic numerical systems and codes.
2. Working principles of basic logic circuits.
3. Axioms and theorems of Boole algebra.
4. Working principles of integrated logic circuits.
5. Working principles of the combination circuits.
6. Logic function minimization technics.
7. Working principles of the combination modules.
8. Working principles of the universal modules: decoder, multiplexor, permanent memory and programmable logic array.
9. Working principles of the sequential circuits: bistable, registers and counters.
10. Working principles of digital arithmetic circuits.
11. Working principles of circuits for generation of digital signals.
12. Working principles of static and dynamic memories.
13. Working principles of digital-analog and analog-digital convertors.

1.4. Course Outline

Numerical systems and codes. Logical circuits. Boole algebra. Integrated logical circuits. Combination circuits. Logic functions minimization. Combination modulus. Universal modules, decoder, multiplexor, permanent memory and programmable logic array. Sequential circuits: bistable, registers and counters. Digital arithmetic circuits. Circuits for generation of digital signals. Static and dynamic memories. Digital-analog and analog-digital convertors.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular class attendance (all students are expected to abide by the class attendance policy set forth by the Faculty of Maritime Studies), and passed course work (achievement tests pass grade). A min of 35 credits.

1.8. Assessment of Learning Outcomes

Course attendance	1.5	Class participation	1	Seminar paper		Experiment	
Written exam	1	Oral exam	1.5	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Assessment of learning outcomes:

- During the classes by collecting 70 credits through the first colloquium (learning outcomes 1.3.1 - 1.3.8, in total 28 credits), second colloquium (learning outcomes 1.3.8 - 1.3.13, in total 29 credits), laboratory work (learning outcomes 1.3.1 - 1.3.13, in total 13 credits);
- On the final exam by collecting additional 30 credits.

Examples of Evaluation:

1. Explain working principles of NAND circuit realized in CMOS technology.
2. Explain working principles of the decoder.
3. Explain working principles of the permanent memory.
4. Explain working principles of the bistable.
5. Explain working principles of the register.
6. Explain working principles of the circuit for digital multiplying.
7. Explain working principles of the circuit for generation of squared signal.
8. Explain working principles of the static and dynamic memories.
9. Explain working principles of the circuit for the analog-digital and digital-analog convertors.

1.1. Main Reading

Lecture materials.

1.2. Recommended Reading

- T.Floyd, Digital Fundamentals, Prentice-Hall, 1997.
- R. Tokheim, Digital electronics, McGraw-Hill, 1990.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Lecture materials	web	78
- T.Floyd, Digital Fundamentals, Prentice-Hall, 1997. - R. Tokheim, Digital electronics, McGraw-Hill, 1990.	1	78

1.4. Quality Assurance

Internal: student feedback at the end of academic year and the course review by the head of course at the end of academic year.
External: Program quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Doc. dr. sc. Zoran Mrak**	
Course	**Maritime radiocommunications**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	Undergraduate	
Type of Course	Compulsory	
Year of Study	2	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	6
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objectives of this unit are to gain knowledge of the GMDSS system required to properly handle communications devices on board, and to prepare students for the title of General Operator (GOC). The course syllabus is based on the STCW Convention and "IMO Model Course 1.25", with the addition of a necessary part in which the required backgrounds in electronic communications are addressed.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

It is expected that students, after regulating the anticipated obligations from this course, will be able to:

1. Describe the modes of propagation of electromagnetic waves as a function of frequency bands
2. Describe the basic elements of radio communication systems (receiver, modulation transmitter, antennas, transmission lines)
3. Indicate the role of individual maritime communications institutions
4. Define and describe the individual elements of the GMDSS system
5. Describe individual communication equipment
6. Indicate the purpose of each communication equipment
7. Handle all ship communication equipment in the GMDSS system
8. Use the devices in the proper manner for the purpose of proper communication
9. Use the supporting literature of the ship's radio station and keep documentation properly.

1.4. Course Outline

Development of maritime communications; The role of individual institutions; Introduction to radiocommunication systems; Information; Analog and digital systems; Electromagnetic waves, modulations, antennas, transceiver ...; GMDSS system; Communication functions; Areas of navigation; MSI Transmission Systems; Marine Communication Equipment (DSC system; VHF radiotelephone transceiver; MF / HF radiotelephone device; NAVTEX system and receiver; INMARSAT devices; SART and AIS SART device; EPIRB devices); Procedures in radio communications (routine communications, communications in the event of danger, emergency and safety ...); Use of compulsory marine literature and radio logging.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	The lectures and exercises are fully compliant with the STCW Convention and "IMO Model Course 1.25". The exercises take place in a specialized simulator for GMDSS communication devices.	

1.7. Student Obligations

Active attendance and at least 70% of course attendance; 2 written and one oral colloquium; final written exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	2	Oral exam	1	Essay		Research	
Project		Continuous Assessment	0,5	Presentation		Practical work	0,5
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The total number of credits consists of 10% attendance and activity in teaching, 60% achieved through continuous examination and 30% in the final exam.

Continuous assessment:
- 1st colloquium, written test 20 questions, learning outcomes 1-3 (20%)
- 2nd colloquium, written test 20 questions, learning outcomes 4-6 (20%)
- 3rd colloquium, oral-practical simulator work - knowledge of devices, procedures and communication, learning outcomes 4-9 (20%)

Final exam:
- final exam is a 30-question test, learning outcomes 1-9 (30%). The passage requires a minimum of 50% points

Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. Describe the propagation of the electromagnetic waves of the HF region.
2. Describe the SSB modulation technique and indicate what types of communications are used.
3. List the communication functions for the needs of the GMDSS system prescribed by the SOLAS Convention.
4. Describe the role of MRCC in the GMDSS system.
5. Describe the parts of the MF DSC equipment.
6. Specify the purpose of the SART equipment.
7. Distress alerting procedure with the INMRSAT F-77.
8. Demonstrate the process of sending a SAFETY priority message using a VHF equipment.
9. Perform a weekly test of the device and record the test results.

1.10. Main Reading

1. Tehnički temelji GMDSS sustava; Josip Sušanj
2. Komunikacijski uređaji i postupci u GMDSS sustavu; Zoran Mrak
3. GMDSS sustav i sigurnost plovidbe; Damir Zec
4. Handbook for marine radio communication; Graham D. Lees, William G. Williamson

1.11. Recommended Reading

1. Manual for use by the Maritime Mobile and Maritime Mobile-Satelite Services; ITU
2. GMDSS/GOC Model Training Course 1.25; IMO
3. Standard Marine Communication Phrases; IMO
4. International Code of Signals; IMO

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials (Lectures) available on the Merlin e-learning system	unlimited	
Teaching materials (Exercises) available on the Merlin e-learning system	unlimited	
Tehnički temelji GMDSS sustava; Josip Sušanj	faculty library	
Komunikacijski uređaji i postupci u GMDSS sustavu; Zoran Mrak	faculty library	
GMDSS sustav i sigurnost plovidbe; Damir Zec	faculty library	

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for insurance quality that is implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of transience are analyzed and yielded appropriate measures.

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3.2. Course description

Generic information			
Head of Course	dr.sc. Nikola Tomac		
Course	Electrotechnical Materials Technology		
Study Programme	ELECTRONIC AND INFORMATION TECHNOLOGIES IN MARITIME		
Level	4.		
Type of Course	compulsory		
Year of Study	2		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		2+1+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of this course is to provide the student with relevant knowledge of the technology of electrical engineering materials and systems prescribed by STCW and IMO Model Courses for the service of an electrical engineering officer.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:
1. Describe the division of technical materials.
2. Explain the basic methods of material production.
3. Describe the structure of the atom: Bohr's hydrogen atom model.
4. Describe electrical materials: properties, definitions and classification.
5. Explain the properties and applications of the guide.
6. Describe the electrical conductivity and basic properties of the conductor.
7. Explain the properties and applications of semiconductors.
8. Explain superconductivity and superconductor properties.
9. Describe the basics of integrated and printed link technology.
10. Explain the properties and application of insulating materials and dielectric.
11. Explain the properties and applications of dielectric materials.
12. Explain the properties and applications of magnetic materials.
13. Explain the properties and applications of optoelectric materials.
14. Explain magnetic and optical memories and storage systems.
15. Explain the basics of integrated and print bonding technology and nanotechnology.

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1.4. Course Outline

Introduction to technical materials and strength tests and technological properties of materials, basics of metallography, basic methods of production of iron and steel, basics of heat treatment, fundamentals of plastic, ceramic, composite and natural materials. Conductive materials, semiconductive materials, magnetic (ferromagnetic) materials, Insulation materials•

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular attendance at classes, regular midterm exams, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	0,9	Essay		Research	
Project		Continuous Assessment	1,6	Presentation		Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Learning outcomes are evaluated through regular class attendance and activity (10%), continuous exams (60%) and final examination (30%). During the class, the student can collect a maximum of 70% of the grade points as follows:
A) Successfully pass 2 oral midterms within the prescribed deadlines. Each passed midterm carries a minimum of 15% and a maximum of 30% of marks and can be taken 3 times. A student who has not achieved all the required learning outcomes cannot take the midterm exam. The next colloquium cannot be accessed unless the previous colloquium is passed. The colloquiums include the following:
1st Colloquium Transformers and Fundamentals of Electromagnetism
2nd Colloquium Asynchronous and DC Machines (Learning Outcomes 1-5)
B) Active attendance (lectures and exercises). Each class absence accounts for 1% of the grade point. Students who have passed both exams can apply for the oral final exam (learning outcomes 1-5) and earn a minimum of 15% and a maximum of 30% of the marks.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. *Describe the division of technical materials.*
2. *Explain the basic methods of material production.*
3. *Describe the structure of an atom: Bohr's model of a hydrogen atom.*
4. *Describe electrical materials: properties, definitions and classification.*
5. *Explain the properties and applications of the guide.*
6. *Describe the electrical conductivity and basic properties of the conductor.*
7. *Explain the properties and applications of semiconductors.*
8. *Explain superconductivity and superconductor properties.*
9. *Describe the basics of integrated and printed link technology.*
10. *Explain the properties and application of insulating materials and dielectric.*
11. *Explain the properties and applications of dielectric materials.*

1.10. Main Reading

Tomac, N. Tehnički materijali, 2012.
Tomac, N .: Technology of Electrotechnical, Lecture Materials

1.11. Recommended Reading

1. I. Vujović, Elektrotehnički materijali i komponente, Neodidacta d.o.o, Zagreb, 2010., 2
2. I. Kuzmanić, R. Vlašić, I. Vujović, ***Elektrotehnički materijali***, Visoka pomorska škola u Splitu, Split, 2001.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Tomac, N. Tehnički materijali, 2012.		

1.13. Quality Assurance

In accordance with ISO 9001 at the Faculty level.

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3.2. Course description

Generic information			
Head of Course	Vlado Frančić, Associate Professor, Ph.D.		
Course	Safety and Quality Management in Shipping		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Level	Bachelor		
Type of Course	Elective		
Year of Study	2	Semester	4
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		**30 + 15 + 0 (2 + 1 + 0)**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to familiarize students with the principles of quality, in general, as well as the principles of safety management systems and quality in shipping. The basic of safety management in shipping is an International Safety Management Code (ISM Code). Students will be familiar with the obligations in accordance with the ISM Code and the application onboard and generally in shipping. In addition, students will be introduced to practical examples of the application of the safety management system on board. Also, students will be able to maintain and improve the general or dedicated safety management systems in ships and in shipping companies by the implementation of the provisions of the ISM Code.

1.2. Prerequisites for Course Registration

Prerequisite for course registration is completed course Safety at Sea (course attendance requirement).
Prerequisite for the examination is successfully completed course Safety at sea (passed exam requirement).

1.3. Expected Learning Outcomes

It is expected that the student will be able to:

- Explain the concept of quality management
- Describe the standardization of quality system.
- Explain the specifics of the development of safety and quality management in shipping.
- Describe the principles of the implementation of the ISM Code in shipping.
- Describe the obligations of shippers and their employees regarding the implementation of the ISM system.
- Explain methods of audit of the safety management systems on board.

1.4. Course Outline

Introduction, the concept of quality. What is quality? Historical development of the quality system. Process of establishing a quality system. Quality standardization (ISO standards). Maritime safety and environmental management system - concepts, legal regulation. Basic principles of maritime safety management. International Safety Management System - ISM Code - concepts, division, general principles and objectives, application. Safety Management System (SMS). The responsibility and authority of the company and the master responsibility and authority. Developing plans for essential shipboard operations and critical situations. Certification, evaluation and control. Amendments to the ISM Rules. Risk assessment and risk management as per of ISM requirements.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	Exercises includes practical work with ship documentation required by the Ism codes (check list, work permit, …)	

1.7. Student Obligations

Active attendance (lectures and exercises) and of regular class attendance (all students are expected to abide by the class attendance policy set forth by the Faculty of Maritime Studies). Obligation of independent tasks creation.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation	0,5	Seminar paper		Experiment	
Written exam		Oral exam	1,0	Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% in class and 30% in final exam (according to the Regulations on Studies of the University of Rijeka and the Regulations Faculty of Maritime Studies in Rijeka).
Continuous assessment:
- Design and presentation of independent tasks - application of ISM code in shipping companies.
- Problem solving in group and individually.

The final exam (oral exam) checks the theoretical knowledge in the field of quality and safety management in Maritime industry (shipping). A minimum of 50% of theoretical knowledge is required.
Examples of evaluating learning outcomes in relation to preset learning outcomes are:
1. Explain the importance of the Master's overriding authority and responsibility to make safety and environmental decisions and to look for assistance from the Company.
2. List essential shipboard operations and explain the obligations of the company in accordance with ISM regulations.
3. Show risk assessment example.

1.10. Main Reading

1. International safety Management Code, IMO Res A.741(18) with amendments (ISM Code), IMO, London.
2. Technical rules for statutory certification of the Croatian Register of Shipping in relation to certification of quality system and safety management system – part 30. Edition 2010.
3. Revised Guidelines on the Implementation of the International Safety Management (ISM) Code - IMO Resolution A.1118(30).
4. Lazibat Tonći: Quality Management (in Croatian) - M.E.P., 2009.
5. Kondić Živko, Quality and ISO 9000 (in Croatian) – TIVA, Varaždin, 2002.

1.11. Recommended Reading

1. Technical rules for statutory certification of the Croatian Register of Shipping, CRS, split.
2. ANDERSON, P. / WRIGHT, J. / NICHOLLS, S./ NOONAN, S. - Cracking the Code: The relevance of the ISM Code and its impact on shipping practices. London, Nautical Institute, 2003. (ISBN 1- 8700 – 77 – 63 - 6).
3. ANDERSON, P. - ISM Code: A practical guide to the legal and insurance implications. 2nd ed. London,

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

Lloyd's of London Press, 2005. (ISBN 1 – 84311 – 471 – 2)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Technical rules for statutory certification of the Croatian Register of Shipping in relation to certification of quality system and safety management system – part 30. Edition 2010. www.crs.hr	Electronic edition	40
International safety Management Code, IMO Res A.741(18) with amendments (ISM Code), IMO, London.	2 + Electronic Edition	
Revised Guidelines on the Implementation of the International Safety Management (ISM) Code - IMO Resolution A.1118(30).	2 + Electronic Edition	
Lazibat Tonći: Quality Management (in Croatian) - M.E.P., 2009.	4	
Živko, Kvaliteta i ISO 9000 – primjena	2	

1.13. Quality Assurance

Quality assurance system of educational process is in accordance with ISO 9001:2015 system as implemented on Faculty of Maritime Studies Rijeka. The analyse of the exams is carried out annually. Students' evaluation is carried out each semester (more details provided in part describing organization of the Faculty).
Additionally – Internal: Student feedback (SET - Student evaluation of teaching) at the end of academic year.
External: Programme quality is reviewed by the QA Agency at regular basis.

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3.2. Course description

Generic information			
Head of Course	**dr. sc. Zoran Mrak**		
Course	**Basics in electronic communications**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Level	Undergraduate		
Type of Course	Compulsory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		45+30+0 (3+2+0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goals of this unit are to familiarize students with the basics of the work of individual circuits of electronic communication systems (transmitters and receivers) prescribed by STCW and IMO Model Courses for the service of Electro Technical Officer.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

It is expected that students will be able to:
1. Define the types of information
2. State and explain the differences between relaxation and harmonic oscillators
3. Describe the different types of harmonic oscillators
4. Explain the differences between oscillators and frequency synthesizers
5. Describe and analyze the PLL frequency synthesizer
6. Describe different modulation techniques
7. Describe ways of analog-to-digital signal conversion
8. Describe signal mixing circuits
9. Describe electronic filters

1.4. Course Outline

Information; sources and types of information. Block diagram of the communication system. Communication channel and noise. Fourier analysis and signal frequency spectrum. Analog and digital communications. Transmitter block diagram: Power systems, low frequency amplifier, carrier wave generator, modulator, decoupling stage and power amplifier. Frequency synthesizer. Amplitude, frequency and phase modulation, single-side band transmission. Digital Communications, PCMs, message encoding, digital modulation, digital information transfer rate, time and frequency multiplex. Receiver block-diagram; input oscillator circuits, local oscillator and mixer, intermediate frequency amplifier, demodulator and low frequency amplifier. Spread spectrum transmission systems.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		
1.7. Student Obligations		

1.8. Assessment[1] of Learning Outcomes

Course attendance	0,5	Class participation	0,5	Seminar paper		Experiment	
Written exam		Oral exam	2	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	1
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The total number of credits consists of 10% attendance and teaching activity, 40% achieved through continuous assessment, laboratory report 20% and 30% at the final exam (according to the Regulations on studies of the University of Rijeka and the Regulations on studying at the Faculty of Maritime Studies in Rijeka)

Continuous assessment:
- 1st colloquium, written test 20 questions, learning outcomes 1-5 (20%)
- 2nd colloquium, written test 20 questions, learning outcomes 6-9 (20%)
- Laboratory report, learning outcomes 1-9 (20%)

Final exam:
- final exam is oral, learning outcomes 1-9 (30%).

Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. Describe the difference between discrete and continuous signals.
2. Give examples of the use of relaxation frequency generators.
3. Describe the role of individual elements in the Colpitts oscillator.
4. List the benefits of using a frequency synthesizer.
5. Explain how to generate the desired frequency with the PLL synthesizer.
6. Describe the FSK modulation technique.
7. Describe the PCM mode of analog to digital signal conversion.
8. Description of operation of a double balanced mixer.
9. Explain the difference between a 1st and 2nd order low-pass filter.

1.10. Main Reading

Roddy D., Coolin J.: "ELECTRONIC COMMUNICATIONS", Lakehead University, Ontario, Canada, Reston Publishing Co., 1984
Young:P. H. "ELECTRONIC COMMUNICATION TECNIQUES", Charles E. Merril Publishing Co., Columbus, Ohio 43216, 1985

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1.11. Recommended Reading

Modlic B., Modlic I.: "TITRANJE I OSCILATORI", Školska knjiga, Zagreb, 1991
Modlic B., Modlic I.: "MODULACIJE I MODULATORI", Školska knjiga, Zagreb, 1994
Gregg W. D.: "ANALOG AND DIGITAL COMMUNICATION", John Willey & Sons, New York, 1986
Sušanj, J.: Tehnički temelji GMDSS sustava, Pomorski fakultet, Rijeka, 1995.
Gregurić, M.: Radio-prijemna tehnika, Školska knjiga, Zagreb, 1980

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the Merlin e-learning system	unlimited	
Literature available at the Faculty Library	6	

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for insurance quality that is implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of transience are analyzed and yielded appropriate measures.

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3.2. Course description

Generic information		
Head of Course	Ph.D. Jasmin Ćelić, assistant professor	
Course	Microcomputer and personal computer	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate degree programme	
Type of Course	Compulsory course	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquiring knowledge about the structure and principles of operation of microcomputers and personal computers.

1.2. Prerequisites for Course Registration

Digital electronics

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. define and explain the structure of computers
2. define and explain the principles of operation of the microcomputer bus system
3. define and explain the principles of operation of the microcomputer memory system
4. define and explain the principles of operation of microprocessors and motherboards of personal computers
5. explain the ways of realization and principles of operation of the personal computer subsystem for data entry
6. explain the methods of realization and principles of operation of the personal computer subsystem for permanent data storage
7. explain the ways of realization and principles of operation of the multimedia subsystem of a personal computer
8. explain the ways of realization and principles of operation of the personal computer subsystem for data printing

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1.4. Course Outline

The structure of microcomputers. Von Neumann computer model. Basic functional parts of a computer, bus, memory, processor. Description of the structure and basic components of personal computers. Types of microprocessors and their properties. Motherboards and buses. Memory. Power. Input units. Video subsystem. Audio subsystem. I / O interfaces. Communications and network systems. Magnetic recording systems. Optical recording systems. Printing devices. Laptops. Computer design and upgrade. Diagnosis, inspection and maintenance.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

1st colloquium, 2nd colloquium, 3rd colloquium, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam	0.5	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	0.5
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- *70% of acquired learning outcomes are evaluated through continuous testing of knowledge during classes:*

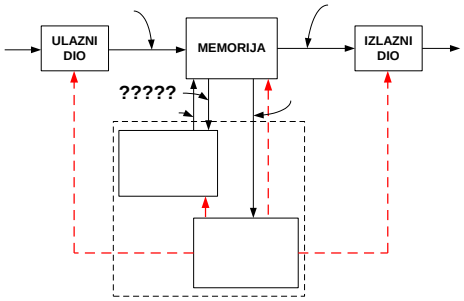
  through the 1st colloquium - learning outcomes 1.-3. (25%), 2nd colloquium - learning outcomes 4.-6. (25%), 3rd colloquium – learning outcomes 7.-8. (20%); in doing so, the student must realize a minimum of 50% of points for each colloquium;
- *at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-8), whereby the student must realize a minimum of 50% of points to pass the final exam;*
- *final ECTS grade, is defined on the basis of the achieved total % of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:*
  - *the grade excellent (5) corresponds to the grade A in the ECTS scale and the success rate from 90 to 100%,*
  - *a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,*
  - *grade good (3) corresponds to grade C on the ECTS scale and a success rate of 60 to 74.9%,*

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

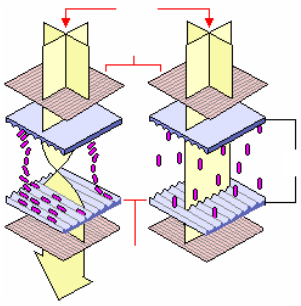
- *a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,*
- *the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.*

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. In the figure, instead of the string ?????, it should be stated
   a) arguments; b) results; c) instructions; d) data and instructions (IU #1)



2. The bus bandwidth is expressed in a measurement unit:
   a) [Hz]; b) [bit / Hz]; c) [bit / sek]; d) [bajt / Hz]; (IU #2)
3. By the term sequential memory we mean
   a) ROM memory; b) RAM memory; c) serial memories; d) temporary memories; (IU #3)
4. What will the status flags show if the following code is executed:
   MOV #5, R03
   CMP #7, R03
   a) Z ☐ N ☑ ; b) Z ☑ N ☐ ; c) Z ☐ N ☐ ; d) Z ☑ N ☑ (IU #4)
5. The basic parts of keyboards are:
   a) keys, memory and arithmetic-logic unit;
   b) keys, memory, control unit and arithmetic-logic unit;
   c) keys, key matrix and keyboard controller;
   d) keys, memory, stepper motor and arithmetic-logic unit; (IU #5)
6. For optical discs, the path drive motor moves the laser at distances of approx.
   a) 1 mm; b) 100 µm; c) 10 µm; d) 1 µm (IU #6)
7. In the figure, instead of the string ?????, it should be stated
   a) regulating layers; b) voltage; c) light; d) polarizing filters; (IU #7)



8. In piezoelectric ink-jet printing nozzle can jet up to
   a) 20 drops of ink per second;
   b) 200 drops of ink per second;
   c) 2,000 drops of ink per second;
   d) 20,000 drops of ink per second; (IU #8)

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1.10. Main Reading

- Ribarić, S. (2011.). Građa računala: arhitektura i organizacija računarskih sustava, Sveučilište u Zagrebu, Algebra, Zagreb, Hrvatska
- Smiljanić, G. (1992.). Mikroračunala, Školska knjiga, Zagreb, Hrvatska

1.11. Recommended Reading

- Mueller, S. (1998.). Upgrading and repairing PCs , 22nd edition, QUE Corporation, Indiana, USA
- Minesi, M. (2004). The Complete PC Upgrade and Maintenance Guide, Sybex inc., Alameda, USA
- Žagar, M., Kovač, M., Basch, D. (1993.). Uvod u mikroračunala, Školska knjiga, Zagreb, Hrvatska

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Ribarić, S. (2011.). Građa računala: arhitektura i organizacija računarskih sustava, Sveučilište u Zagrebu, Algebra, Zagreb, Hrvatska	*10*	*50*

1.13. Quality Assurance

The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once a semester a survey is conducted among students.

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3.2. Course description

Generic information			
Head of Course	Miroslav Bistrović		
Course	Automation of ship systems		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Compulsory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		45 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The course aims to gain fundamental insight and knowledge of the areas of ship automation and topics

1.2. Prerequisites for Course Registration

Fundamentals of Electrical Engineering I, Fundamentals of Electrical Engineering II, Fundamentals of Automation.

1.3. Expected Learning Outcomes

After completing the obligations and passing the course, students can:

1. Describe the basic features of the field of application of ship automation systems at different time epochs.
2. Explain the evaluation, establishment, exploitation of management systems and the technical and economic aspect of ship automation.
3. Analyze and explain the operation and control modes used in the automation of ship systems.
4. Break down the essential components of the automatic control and control system.
5. Explain algorithms for managing technological processes of ship systems.
6. Apply and know the regulations of the ship automation registers.
7. Use technical documentation.
8. Develop the ability to analyze, the ability to learn through team and individual work, and the ability to manage information and present it.

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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1.4. Course Outline

Historical development of ship systems automation. The technical and economic aspect of ship automation. Valuation, establishment and operation of ship management systems. Classification and basic features on-board automation systems, regulations, rules and requirements of classification societies. Ship systems. Processing essential components of marine control systems: transmitters, regulators and actuators. Linear and nonlinear systems. Continuous and discrete control systems. Algorithms for managing ship technological processes system. Introduction and use of technical documentation. Automation of auxiliary engines. Automation generators. Power plant automation. Main Drive Machine Automation. Automation of auxiliaries system. Automatic course control system. Automatic embarkation and disembarkation system. General review and analysis of the application of automation of ship systems on vessels in accordance with STCW and IMO.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Attend classes and fulfil all obligations on time.
Actively participate in classes.
Attend exercises regularly.
Approach proficiency testing and a score of more than 50% of marks.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,5	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Evaluation is done by conducting two tests during the class and the final exam.
Examples of evaluating learning outcomes about with concerning set learning outcomes are:
1) Classification of automation systems on ships by purpose.
2) Explain the stages of ship automation and their characteristics according to management and control equipment.
3) What is the use of the automatic control system?
4) State and briefly explain the basic requirements that are before the automated control systems.
5) Registry requirements concerning the power supply of the alarm and security systems.
6) Indicate the levels of the complete ship control and management system.
7) What is the purpose of an automated regulation and show the forms of SAR functioning algorithms?
8) Draw and explain the principle of operation of an electronic controller with an operational amplifier.
9) Time-response stability condition.
10) Explain the interaction of PID controller parameters on quality time indicators by tables.
11) Draw a control circuit in a system for one-component regulation of the water level in a steam drum, indicate all parts of the control circuit, note the name, value and unit of measurement for the reference and the regular size to be regulated.

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.10. Main Reading

- Valčić, M., Tomas, V .: Ship Systems Automation, Authorized Lectures, Faculty of Maritime Studies, Rijeka, Rijeka, 2016.
- R. Antonić: Ship Automation II, Faculty of Maritime Studies, Split, Split, 2005.

1.11. Recommended Reading

- Vukic, Z., Kuljaca, Lj .: Automatic Control - Linear Systems Analysis, Kigen doo, Zagreb, 2004.
- Fossen, TI: "Marine Control Systems - Guidance, Navigation and Control of Ships, Rigs and Underwater
- Vehicles ", Marine Cybernetics, Trondheim, Norway, 2002.
- Lin, CF: Modern Navigation, Guidance, and Control Processing, Practice Hall, Inc., 1991.
- K-Sim ERS L11 5L90MC - VLCC Version MC90-V, Operator's Manual, Part 3: Machinery & Operation, Kongsberg Maritime, Norway, 2014.
- Lyngso Marine MOS / MCS 2200 Monitoring System, Denmark, 2005.
- NACOS Platinum Operating Instructions ED 3100 G 150/02 (2011-07)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
	Web (e-college)	59

1.13. Quality Assurance

The method of monitoring the quality of the program is governed by mechanisms which are developed and applied at the institution level (in accordance with ISO 9001 at the Faculty of Maritime Studies).

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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3.2. Course description

Generic information		
Head of Course	Aleksandar Cuculić, Assistant professor	
Course	Power electronics	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate	
Type of Course	Compulsory	
Year of Study	III	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	2+1

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of this course is to provide the student with relevant knowledge required for operation and maintenance of power electronics devices as prescribed by STCW and IMO Model Courses for the service of marine electro technical officers (ETO).

1.2. Prerequisites for Course Registration

Completed courses: Electronic devices and circuits

1.3. Expected Learning Outcomes

1. Define the areas of power electronics application on merine vessels.
2. Explain the operating mode and describe the types of semiconductor valves used in power electronics circuits, drivers and the design of the protective circuits.
3. Understand the operation and construction of single-phase and three-phase diode and thyristor rectifiers and describe their application areas on board.
4. Know basic topologies and understand how DC-DC converters work.
5. Understand the operation of the current source and voltage source inverters and know the methods of pulse width modulation.
6. Understand operation principles and basic topologies of switching mode power supplies.
7. Know the operation principles of resonant switches and resonant converters.
8. Analyze the impact of power electronics circuits on the ship's electrical power quality.

1.4. Course Outline

Historical development of power electronics. Application of power electronics on vessels. Regulations. Semiconductor valves. Control and protection circuits for semiconductor valves. Passive rectifiers. Battery charger. Cathodic protection. Thyristor soft starter. Thyristor AC regulator. Switching mode power supplies. Inverters. Resonant converters. Uninterruptible power systems. Frequency converters. Active (PWM) rectifier. Active filter. Influence of energy electronics devices on power quality. Application of power electronics in ship's electrical power sources.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☒ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments	

1.7. Student Obligations

Regular follow-up of classes (lectures and exercises), continuous assessment, and passing the oral final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka as follows:

• 70% of the acquired learning outcomes through the continuous assessment 1st mid-term exam - through learning outcomes 1-4 (35%), 2nd mid-term exam - through learning outcomes 5-8 (35%); the student must have completed at least 50% of points in each mid-term exam.

• 30% of the acquired learning outcomes (1-8) are evaluated in the final part of the exam, with a minimum of 50% credit for passing the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Design a control circuit for a bipolar transistor that maintains a base current of 0.5A when switched on, and the maximum current peak that can occur during switching on is 2A. The control pulses have an amplitude of 15V, duty cycle is 35% and the switching frequency is 100KHz.
2. 2. A single-phase bridge rectifier (Graetz) must supply a 10W load. The average value of the output voltage is 20V and maximum allowable DC voltage ripple is 1.5Vpp. The rectifier is powered by a single-phase transformer to which the primary is connected to a mains voltage of 220V and 50Hz. Calculate the required RMS value of the secondary voltage and the capacitance of the filter capacitor.
3. 3. The DC-DC voltage converter has an input voltage of 50V, L = 400 µH and a filter capacitor C = 200 µF. It is loaded with a resistive load of 20 Ω. Calculate the output voltage, maximum and minimum current through the inductor if the ON time of the semiconductor switch is 15 µs and the OFF time is 35 µs.

1.10. Main Reading

Teaching materials on the Merlin e-learning system (https://moodle.srce.hr)

1.11. Recommended Reading

John G. Kassakian, Martin F. Schlecht, George C. Verghese ; Principles of power electronics, Graphis 2010

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials on the Merlin e-learning system	Available on Web	40
John G. Kassakian, Martin F. Schlecht, George C. Verghese ; Principles of power electronics, Graphis 2010	2	40

1.13. Quality Assurance

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analysed and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	Irena Jurdana	
Course	Electronic Navigation Devices	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	bachelor	
Type of Course	mandatory	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The basic objectives of the course are the acquisition of knowledge of electronic navigation devices and according to the STCW Convention. The course deals with the theoretical and practical basis of work and application of navigation devices on ships.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

1. Describe the types and application of electronic navigation devices
2. Observe hyperbolic navigation systems
3. Describe the principle of work and the type of gyrocompass
4. Explain the types and application of the GPS and DGPS system, and the principle of work
5. Describe the radar, basic features, and impulse radar
6. Analyse ultrasonic navigation systems
7. Explain the AIS communications navigation system and its application
8. Analyse and describe VDR

1.4. Course Outline

Basics of electronic navigation, overview of electronic navigation systems, Hyperbolic navigation systems, LORAN C system, GPS - Global Positioning System, DGPS, Doppler Effect, GLONASS, RADAR, ARPA, Ultrasonic systems, Sonars, Gyrocompass, Optical gyros - Sagnac effect, Automatic Identification System and VTS (Vessel Traffic System), VDR, Speed log.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Regular attendance to lectures, to 1st and 2nd mid-term exam, presentation of exercises in the practical work session, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	0,5	Oral exam	1	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating acquired learning outcomes is based on the regulation on University of Rijeka Studies and the regulation on Studying at the Faculty of Maritime Studies in Rijeka as follows:

• Through continuous assessment of knowledge during the course, 70% of the learning outcomes gained through the 1st mid-term exam - learning outcomes 1-4 (25%), 2nd mid-term exam - learning outcomes 5-8 (25%) are valued, including presentation of the practical task - learning outcomes 1-10 (10% in each mid-term exam); the student must achieve at least 50% points for each mid-term exam.

• 30% of the learning outcomes (1-8) are evaluated in the final part of the exam (oral), with the student passing the final exam at least 50% of the points.

Examples of learning outcomes in relation to the set learning outcomes are:

1. Define and explain comparation of analogue and digital communication parameters
2. Describe the types and application of electronic navigation devices
3. Observe hyperbolic navigation systems
4. Define basic types of gyrocompass and describe the working principle of work
5. Explain the types and application of the GPS system, and the principle of signal propagation
6. Compare the differential GPS with the classic GPS system
7. Describe the radar, basic features, and basic principle of impulse radar
8. Understand the use and basic functions of ultrasonic navigation systems
9. Explain the AIS communications navigation system and its application
10. Explain the use of the VDR system.

1.10. Main Reading

1. Jurdana I., Sušanj J.; Sustavi elektroničke navigacije, Pomorski fakultet Rijeka, 2013.
2. Sušanj J., Navigacijski radar, Pomorski fakultet Rijeka, 2006.
3. Reading material available on e – learning system - Merlin - (https://moodle.srce.hr)

1.11. Recommended Reading

1. Čavara J., Uvod u radarsku tehniku, 2008.
2. Zentner E: Radiokomunikacije, Školska knjiga, Zagreb, 19803.Sonnenberg G.J., Radar and Electronic Navigation, Cambridge, 1988.
3. Tetley L., Calcutt D., Electronic Navigation Systems, Oxford, 2003.
4. Reading material available on e – learning system - Merlin (https://moodle.srce.hr)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Sušanj J., Navigacijski radar, Pomorski fakultet Rijeka, 2006.	6	55
Jurdana I., Sušanj J.; Sustavi elektroničke navigacije, Pomorski fakultet Rijeka, 2013.	6	55
Reading material available on e – learning system - Merlin (https://moodle.srce.hr)	-	55

1.13. Quality Assurance

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The quality of the study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once in semester is conducted by anonymous student evaluation of teaching.

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3.2. Course description

Generic information		
Head of Course	Ph.D. Jasmin Ćelić, assistant professor	
Course	Maintenance of electronic systems	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate degree programme	
Type of Course	Compulsory course	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Introduction to the purpose and methods of maintenance, maintenance support and maintenance resources of electronic systems, especially marine electronic systems.

1.2. Prerequisites for Course Registration

There are no prerequisites.

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. Explain the basic concepts and quantities that characterize the operating and malfunction of electronic systems
2. Explain the purpose and types of maintenance, maintenance support and maintenance resources
3. Explain the elements of maintenance costs
4. Explain maintenance management processes
5. Describe modern approaches and methods in maintenance
6. Identify and explain the specifics of maintaining telecommunications, IT and marine electronic systems.

1.4. Course Outline

Basic terms and definitions (system and components, failure, recovery, reliability, availability, maintainability, dependability, security). Maintenance, maintenance support and system maintenance resources. Maintenance aspects over the life of the system. Characteristic maintenance processes. Corrective and preventive maintenance. Reliability-oriented maintenance. E-maintenance. Maintenance errors. Maintenance and maintenance cost management. Specifics of maintenance, maintenance support and maintenance resources of telecommunication, information and marine electronic systems.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

1st colloquium, 2nd colloquium, 3rd colloquium, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Continuous Assessment	0.5	Presentation		Practical work	0.5
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- *70% of acquired learning outcomes are evaluated through continuous testing of knowledge during classes:*

  through the 1st colloquium - learning outcomes 1.-2. (25%), 2nd colloquium - learning outcomes 3.-4. (25%), 3rd colloquium – learning outcomes 5.-6. (20%); in doing so, the student must realize a minimum of 50% of points for each colloquium;
- *at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-6), whereby the student must realize a minimum of 50% of points to pass the final exam;*
- *final ECTS grade, is defined on the basis of the achieved total % of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:*
  - *the grade excellent (5) corresponds to the grade A in the ECTS scale and the success rate from 90 to 100%,*
  - *a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,*
  - *grade good (3) corresponds to grade C on the ECTS scale and a success rate of 60 to 74.9%,*
  - *a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,*
  - *the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.*

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. A failure of a redundant electronic system is an accidental event characterized by the cessation of the ability to perform the required function of any of the components of that system.
   ☐ YES ☐ NO (IU #1)
2. The maintenance of any electronic system must include both preventive and corrective maintenance of that system.
   ☐ YES ☐ NO (IU #2)
3. The majority of the total costs over the life of a complex electronic system shall be incurred during the period of use and maintenance of that system.
   ☐ YES ☐ NO (IU #3)
4. Maintenance management of a complex electronic system consists, among other things, in supervising the performance of basic activities of preventive and corrective maintenance of that system.
   ☐ YES ☐ NO (IU #4)
5. RCM program of a complex electronic system is basically a program of corrective maintenance of that system which increases its reliability.
   ☐ YES ☐ NO (IU #5)
6. E-maintenance is the preventive and corrective maintenance of electronic information and communication systems and the provision of support for that maintenance.
   ☐ YES ☐ NO (IU #6)

1.10. Main Reading

- Ćelić, J., Kraš, A. (2019.). Održavanje i podrživost kompleksnih sustava. Sveučilište u Rijeci, Pomorski fakultet, Rijeka, Hrvatska. Available on the e-learning system: https://moodle.srce.hr (Merlin)

1.11. Recommended Reading

- Tortorella, M. (2015.). Reliability, Maintainability and Supportability, John Wiley & Sons, USA
- Mobley, R., K. (2014.). Maintenance Engineering Handbook. McGraw-Hill Education, 8 edition, USA

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Ćelić, J., Kraš, A. (2019.). Održavanje i podrživost kompleksnih sustava. Sveučilište u Rijeci, Pomorski fakultet, Rijeka, Hrvatska. Available on the e-learning system: https://moodle.srce.hr	*e-edition*	*50*

1.13. Quality Assurance

The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once a semester a survey is conducted among students.

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3.2. Course description

Generic information		
Head of Course	Damir Zec, Ph.D.	
Course	Marine environmental protection	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate	
Type of Course	Elective	
Year of Study	2	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	2
	Number of Hours (L+E+S)	30 + 0 + 0 (2 + 0 + 0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to acquaint students with the principles, regulations and measures of environmental protection, and especially the part related to the protection of the marine environment from pollution from ships. Therefore, the subject contains material pertaining to theoretical, technical and legislative framework, i.e. relations of organisms and sources of pollution, in accordance with the requirements of the STCW Convention.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

After passing the exam in this course students will be able to do the following:

- correctly interpret the basic concepts of ecology;
- explain and interpret the adverse impact of individual pollutants on biocenosis and the environment on a particular biotope;
- analyse individual MARPOL 73/78 Annexes to the Convention,
- use the documentation from the appendices of each MARPOL Annex
- explain the procedures and measures in case of pollution.

1.4. Course Outline

Ecology. Ecosystem. Protection of the marine environment. Sea ecosystem factors. Harmful pollutants. Ship as a source of pollution. MARPOL 73/78 Convention. Annex I (Prevention of oil pollution). II (Prevention of pollution by bulk chemicals). III (Prevention of marine pollution by harmful substances in packaged form). IV (Prevention of marine pollution by faecal waters). V (Prevention of pollution by ship waste). VI (Prevention of air pollution from ships). Practical use of documentation from MARPOL Annexes. Ballast water. Underwater paints with biocide, Onshore reception facilities. SOPEP. Procedures in case of pollution.

1.5. Modes of Instruction

☒ Lectures	☐ Practical work
☐ Seminars and workshops	☐ Multimedia and Network
☐ Exercises	☐ Laboratory
☐ E-learning	☐ Mentorship
☐ Field work	☐ Other _____

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1.6. Comments	

1.7. Student Obligations

Active participation and at least 70% of class attendance.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.0	Class participation		Seminar paper		Experiment	
Written exam	1.0	Oral exam	1.0	Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

1. 70% in class and 30% in final exam (written and oral exam)
2. Written exam covering general protection of the sea and the marine environment, international system of protection of the sea and ship maintenance (at least 75% of correct answers, all learning outcomes are required)
3. Oral exam - checking the integrity of theoretical knowledge in the field of marine and marine environment protection (minimum 50% of theoretical knowledge required)

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Explain the basic concepts of environmental protection (1)
2. Classify the types and impacts of marine pollution from ships (2)
3. Explain ways to protect the sea from oil pollution (3)
4. Prepare a report on ship-to-shipment waste (4)
1. 5. explain the procedures in case of intensive pollution of the sea by harmful substances (5)

1.10. Main Reading

1. Zec, D. author's presentations
2. Klepac, R.: Osnove ekologije, JUMENA, Zagreb 1990.
3. IMO, MARPOL 73/78., Consolidated Edition, London 2017.
4. Dorčić, I.: Osnove čišćenja uljnih zagađenja, SKTH, Zagreb

1.11. Recommended Reading

1. Golubić, J. Promet i okoliš, Fakultet prometnih znanosti u Zagrebu, Zagreb, 1999.
2. Botkin, D., Keller, E., Environmental science, J. Wiley & sons, Inc., New York, 1995.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Zec, D. Autorske skripte	Unlimited (web)	80
Klepac, R.: Osnove ekologije, JUMENA, Zagreb 1990.	2	
IMO, MARPOL 73/78., Consolidated Edition, London 2017.	Unlimited (web)	
Dorčić, I.: Osnove čišćenja uljnih zagađenja, SKTH, Zagreb	7	

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the failure to pass are analysed and appropriate measures are adopted.

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	**Doc. dr. sc. Zoran Mrak**		
Course	**Marine communications equipment**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Level	Undergraduate		
Type of Course	Compulsory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goals of this unit are to familiarize students with the technical characteristics and mode of operation of GMDSS communication devices, in order to be able to independently analyze the block diagram of the device, to find and repair failures by replacing the defective module. The course program is based on the STCW Convention and "IMO Model Course 1.31".

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

It is expected that after regulating the course requirements, students will be able to:

1. State the technical characteristics of communication devices in the GMDSS system.
2. Describe the role of individual circuits in marine communication devices.
3. Analyze the operation of the device using block diagrams, and in some cases at the element level.
4. Detect individual module-level failures.
5. Test the device.

1.4. Course Outline

Marine VHF Transceiver; MF / HF transceiver - technical specifications; block diagram analysis of devices.
VHF / MF / HF DSC Devices - Technical Specifications; block diagram analysis of devices.
Radio Telex (NBDP) device and Navtex device: description of radio telex device parts; technical characteristics; block diagram analysis of devices.
Satellite Communication Devices: INMARSAT C Device - Technical Specifications; analysis of block diagrams of devices, purpose of different parts, modules and elements.
EPIRB device: performance of the device; the content of the message; registration and coding; programming EPIRB devices; basic maintenance and testing.
SART: technical characteristics and mode of operation; range of SART devices; use of SART devices; maintenance and testing.
Maintenance of marine antenna systems.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Active attendance of classes and at least 70% of completed classes, individual assignment, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation	0,5	Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment		Presentation	0,5	Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The total number of credits consists of 10% attendance and activity in teaching, 40% achieved by the completion of an individual assignment, and 50% in the final exam (according to the Regulations on studies of the University of Rijeka and the Regulations on study at the Faculty of Maritime Studies in Rijeka)

To create a standalone assignment:
- It is necessary to isolate, analyze and present the operation of each circuit using the technical manual of each device. The assignment is assigned to each student separately at the beginning of the semester. (40%)

Final test:
- final exam is oral, learning outcomes 1-5 (50%).
Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. State the technical characteristics of the VHF radio transmitter.
2. Describe the role of the ATU assembly in the MF / HF transmitter.
3. Explain the demodulation process in a VHF DSC receiver using the block diagram of the device.
4. Describe how the Preemphasis network assembly works in a VHF radio telephone system.
5. Explain the SART device testing procedure.

1.10. Main Reading

- IMO MODEL COURSE 1.31; SECOND CLASS RADIOELECTRONIC CERTIFICATE (GMDSS) COURSE/COMP., London 2002.
- Mrak, Z.: Komunikacijski uređaji i postupci u GMDSS sustavu, Pomorski fakultet, Rijeka, 1995.
- IMO Rezolucije.
- ITU-R Preporuke
- Tehnički priručnici uređaja

1.11. Recommended Reading

Agilent Technologies Educator's Corner: www.educatorscorner.com
SGC (Stoner-Goral Communications): www.sgcworld.com

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the Merlin e-learning system	unlimited	
Radio communication device technical manuals available on the Merlin e-learning system	unlimited	
Literature available at the Faculty Library	6	

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for insurance quality that is implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of transience are analyzed and yielded appropriate measures.

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3.2. Course description

Generic information			
Head of Course	Vinko Tomas		
Course	Computer management of ship systems		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate degree programme		
Type of Course	Compulsory course		
Year of Study	3 years		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4	
	Number of Hours (L+E+S)	30+30+0	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are to gain knowledge of the basic principles and techniques in the design and operation of process computers in control systems used in navigation.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. Demonstrate the historical development of ship automation and the expected improvements
2. To show and explain the stages of development of computer control systems and specific problems
3. Define the methods by which management systems are valued
4. Demonstrate ways of connecting processes and computers, and ways of forming the hardware structure of PLC and SCADA systems.
5. Describe software support and how to install the program in the ship's control systems
6. Describe the basic input / output components of a ship's computerized control systems
7. Demonstrate different performances of the process control algorithm for ship systems
8. Demonstrate the operating principles of the automation of individual ship systems

1.4. Course Outline

Historical development of ship automation and expected improvements. Development of computer control systems and specific problems. Process management. Computer process management (historical development, basic functions of computers in process management, direct digital management, planning management, supervisory management, hierarchical process management using computers, centralized and distributed computer management). Real-time computer systems. Connecting Processes and Computers. Programmable logic controller - PLC. SCADA systems. Examples of systems for monitoring, managing and collecting data on board.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

1st colloquium, 2nd colloquium, design and presentation of a research assignment in an hour of exercises, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper	0,5	Experiment	
Written exam	0,5	Oral exam	0,5	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out in accordance with the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka as follows:

- through continuous assessment of knowledge during class 70% of the acquired learning outcomes are assessed. Those include: 1st semester exam (midterm) - learning outcomes 1-4 (25%), 2nd semester exam (midterm) - learning outcomes 5-8 (25%), presentation of the research assignment (seminars) - learning outcomes 1-8 (20%); the student must score at least 50% of points in each midterm, while the presentation of the research assignment is evaluated on the basis of elaborated evaluation criteria;
- 30% of the obtained learning outcomes (1-8) are evaluated at the final exam, with the student having to complete at least 50% of points for passing the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Areas of improvement and factors contributing to the development of ship automation and their impact
2. Development cycle and specific difficulties in developing a new management system
3. Postulates describing the procedures, relationships and logic of the guidance system
4. Types of process signals at the transmission line interface and the process computer
5. Interaction of the basic processing unit, the process controller and the parent guidance system
6. What is a PLC, its structure, what is a scene cycle, ways of programming a PLC
7. Ways and measures to eliminate the effect of interference on process signals (distortion)
8. Level 4 and Level 5 functional systems may perform all or some of the functions of a multi-hierarchical control system
9. Level measuring and handling system (operating principle, features, configurations)
10. DATA BRIDGE Navigation System (Features, Configurations, Attached Navigation Instruments)

1.10. Main Reading

1. V. Tomas, **Computer management of ship systems** , authorized lectures (textbook in preparation),
2. E-course syllabus available on the e-learning system - Merlin

1.11. Recommended Reading

1. T.I. Fossen: "Marine Control Systems - Guidance, Navigation and Control of Ships, Rigs and Underwater Vehicles", Marine Cybernetics, Trondheim, Norway, 2002.
2. George M. Siouris: Missile Guidance and Control Systems, Springer New York, 2013
3. Konsberg manual-“Integrated ship control-Functional specification-Power menagment system, process

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
V. Tomas, Ship automatic control, authorized lectures (textbook in preparation)	55	55
E-course syllabus available on the e-learning system - Merlin	-	55

1.13. Quality Assurance

Quality assurance is based on Faculty ISO 9001 system. Yearly analyze is produced based on quantitative student examination data, and qualitative based on student survey derived at the end of each semester.

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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3.2. Course description

Generic information		
Head of Course	Aleksandar Cuculić, Assistant professor	
Course	Ship electric propulsion	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate	
Type of Course	Compulsory	
Year of Study	III	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	3+1

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to deepen the knowledge of the components and systems of electrical propulsion of the ship required for high-level and scientific work in the field of maritime transport technology.

1.2. Prerequisites for Course Registration

Completed courses: Power electronics and Marine electrical systems

1.3. Expected Learning Outcomes

1. Define the benefits of using electrical propulsion on ship.
2. Explain how electric motors are operated and evaluated in the ship's propulsion system.
3. Understand the working principles and design of the frequency converters (cycloconverter, synchro converter and PWM converter).
4. Understand the role of propulsion transformers and their connections.
5. Understand the principles of electrical power generation on vessels with electric propulsion.
6. Know how to apply high voltage on ship, the dangers during work with high voltage and safety measures.
7. Analyse the harmonic distortion of currents and voltages on electrically propelled vessels.
8. Know the class rules and regulations related to electrical propulsion and high voltage systems.

1.4. Course Outline

Historical development. Exploitation advantages. Propulsion electric motors. Propulsion converters and transformers. Production of electricity. Electrical power quality. High voltage on ships. Power System Configurations. Class society rules and regulations. Fault diagnosis and maintenance.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular follow-up of classes (lectures and exercises), continuous assessment, and passing the oral final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka as follows:
• 70% of the acquired learning outcomes through the continuous assessment 1st mid-term exam - through learning outcomes 1-4 (35%), 2nd mid-term exam - through learning outcomes 5-8 (35%); the student must have completed at least 50% of points in each mid-term exam.
• 30% of the acquired learning outcomes (1-8) are evaluated in the final part of the exam, with a minimum of 50% credit for passing the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Describe the energy transmission chain in the ship's propulsion system.
2. Analyse the input current of the cycloconverter and its harmonic spectrum.
3. What is the role of shunting thyristors in a syncro converter?
4. Analyse the influence of the frequency modulation index on the harmonic spectrum of the current of the propulsion motor powered by the PWM converter.
5. List the five basic safety rules for high voltage operation.
6. How to test insulation resistance on marine high voltage devices?
7. How do propulsion converters affect the electrical power quality of the ship's network?

1.10. Main Reading

Teaching materials on the Merlin e-learning system (https://moodle.srce.hr)

1.11. Recommended Reading

Hall, Dennis T. Practical marine electrical knowledge. Witherby Seamanship International, 2014

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials on the Merlin e-learning system	Available on Web	30
Hall, Dennis T. Practical marine electrical knowledge. Witherby Seamanship International, 2014	3	30

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analysed and appropriate measures are adopted.

[1] NOTE: Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Miroslav Bistrović		
Course	On-board training		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Electoral		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		2
	Number of Hours (L+E+S)		0 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to direct students to professional work and teamwork on board to meet the required the minimum requirements necessary for practical training in the duties, duties and responsibilities of officers for electrical engineering according to the STCW Convention of 2010 Table-III / 6.

1.2. Prerequisites for Course Registration

/

1.3. Expected Learning Outcomes

It is expected that after completing the coursework, students can:
1. Describe and interpret the general knowledge of the duties of individual crew members.
2. Know duties as a ship electrician.
3. Develop the ability to perform work tasks safely.
4. Explain how to maintain, operate electrical, electronic and control systems on the ship.
5. Know the functional properties, technological conditions and way of operation and maintenance of fire extinguishing agents and lifeboats on the ship.
6. Develop the ability to analyze, the ability to learn through team and individual work, and the ability to manage information and their presentation.

1.4. Course Outline

Introduction to navigation practice.
Get to know life on a ship.
Obligations of individual crew members.
Use of technical documentation.
Familiarity with safety measures related to personnel and the ship, emergency procedures using rescue equipment, firefighting equipment and practical provision of medical first aid on board.
Duties of an Electrical Engineering Officer under the STCW Convention.

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1.5. Modes of Instruction	☐ Lectures ☒ Seminars and workshops ☐ Exercises ☐ E-learning ☒ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Attend classes and fulfil all responsibilities on time.
Actively participate in classes.
Access the knowledge test.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating the acquired learning outcomes carried out according to the University of Rijeka Study Rulebook and Rulebook on a study at the Faculty of Maritime Studies in Rijeka, so that they can discuss during discussions, analyses and reviews are carried out on an ongoing basis. Students are evaluated and evaluated. Moreover, based on the pledge.

1.10. Main Reading

1. Ordinance on titles and certificates of competence of seafarers. Ministry of Maritime Affairs, transport and infrastructure: 10/28/2013, ELI: / Eli / official / 2013/130/2834.
2. STCW Regulations for the Training, Certification and Watchkeeping of Seafarers, Resolution 2. STCW States Parties to the 1995 Convention
3. International Convention on Standards for Training, Certification and Watchkeeping of Seafarers, London, July 1978, NN - Int. contracts 1/92
4. Pazanin, A.: Marine Engines, Palga, Split, 1998.
5. Ozretic, V.: Naval Auxiliary Machines and Devices, SSM, Split, 2003.

1.11. Recommended Reading

1. Marine Electrical Knowledge, Antwerp Maritime Academy Navale Engineering; Author: Willem Maes, February 19, 2013.
2. Ship's Electro-Technology: Part ;. For Marine Engineers and Electrical Officers; Marine Insight .; Publication date: Oct '2013.
3. International Convention for the Safety of Life at Sea, 1974 (SOLAS 74).

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
	Web	33

1.13. Quality Assurance

The method of monitoring the quality of the program is governed by mechanisms which are developed and applied at the institution level (in accordance with ISO 9001 at the Faculty of Maritime Studies.).

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3.2. Course description

Generic information		
Head of Course	Ph.D. Jasmin Ćelić, assistant professor	
Course	Intelligent transportation systems	
Study Programme	Marine Electronic Engineering and Information Technology	
Level	Undergraduate degree programme	
Type of Course	Elective course	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of this course are to acquire basic knowledge in the field of intelligent transportation systems, as well as to get acquainted with the basic principles and techniques in the design and operation of modern systems.

1.2. Prerequisites for Course Registration

There are no prerequisites.

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. Define the basic laws on which the ITS functionality is based.
2. Explain and demonstrate the principles of network management.
3. Describe the development of ITS.
4. Present and explain the procedures for the implementation of ITS in transport infrastructure.
5. Demonstrate the justification and benefit of ITS implementation.
6. Describe telematic solutions of the transport system.
7. Describe and present the principles of operation of electronic systems of transport entities.
8. Define the prerequisites for the development and implementation of ITS services.

1.4. Course Outline

General information on intelligent transport systems. Standards and norms. Fundamentals of systems theory and cybernetics. Physical and logical architecture of ITS. Traffic modeling. Communications in intelligent transport systems. Expert systems for the application of artificial intelligence to transport systems. Intelligent navigation system. Intelligent transport systems and control systems. Expert maintenance systems. Diagnostics in intelligent transport systems.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

1st colloquium, 2nd colloquium, development and presentation of a research task, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation	0.5	Seminar paper	1	Experiment	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Continuous Assessment	0.5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- *70% of acquired learning outcomes are evaluated through continuous testing of knowledge during classes:*

  through the 1st colloquium - learning outcomes 1.-4. (25%), 2nd colloquium - learning outcomes 5.-8. (25%), research task – learning outcomes 1.-8. (20%); in doing so, the student must realize a minimum of 50% of points for each colloquium, while the presentation of the research task is evaluated on the basis of elaborated assessment criteria;
- *at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1.-8.), whereby the student must realize a minimum of 50% of points to pass the final exam;*
- *final ECTS grade, is defined on the basis of the achieved total % of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:*
  - *the grade excellent (5) corresponds to the grade A in the ECTS scale and the success rate from 90 to 100%,*
  - *a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,*
  - *grade good (3) corresponds to grade C on the ECTS scale and a success rate of 60 to 74.9%,*
  - *a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,*
  - *the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.*

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Part of the ITS life cycle may be:
   - A Physical analysis ☐
   - B Physical synthesis ☐
   - C Functional composition ☐
   - D Functional decomposition ☐ (IU #1)

2. Types of control include:
   - A Feedforward control ☐
   - B Adaptive control ☐
   - C Control on demand ☐
   - D Feedback control ☐ (IU #2)

3. Physical, logical and communication point of view includes:
   - A Service ITS architecture ☐
   - B ITS Framework architecture ☐
   - C National ITS architecture ☐
   - D Mandatory ITS architecture ☐ (IU #3)

4. The basic step in the request detection process can be:
   - A User specification and problem prevention ☐
   - B User classification and troubleshooting ☐
   - C User prediction and problem separation ☐
   - D User identification and problem definition ☐ (IU #4)

5. The level of service in intelligent roads is measured by:
   - A Driving safety ☐
   - B Freedom of maneuver ☐
   - C Sensors ☐
   - D Driving comfort ☐ (IU #5)

6. ITS vehicle adaptation includes:
   - A Vehicle starting devices ☐
   - B Vehicle controls ☐
   - C Vehicle stopping devices ☐
   - D Vehicle maintenance devices ☐ (IU #6)

7. Sensors can be:
   - A MENS sensors ☐
   - B Chemical sensors ☐
   - C Magnetic sensors ☐
   - D Neon sensors ☐ (IU #7)

8. The benefits of ITS are visible in:
   - A Increase in emissions of pollutants ☐
   - B Reducing the number of road signs ☐
   - C Increasing the number of foreign guests ☐
   - D Number of employees at gas stations ☐ (IU #8)

1.10. Main Reading

- Williams, B. (2008.). Intelligent Transport Systems Standards, Artech House, Boston, USA.

1.11. Recommended Reading

- Group of authors. (2000.). Intelligent Transportation Primer, Institute of Transportation Engineers, Washington, USA.
- Chen, Y., Li, L. (2013.). Advances in Intelligent Vehicles, Elsevier, Academic Press.
- Zilouchian, A., Jamshidi, M. (2001.). Intelligent Control Systems Using Soft Computing Methodoligies, CRC Press, London, UK.
- Gupta, M., Sinha, N. K. (1995.). Intelligent Control Systems - Concept and Applications, IEEE Press, Piscataway NJ, USA.
- Internet:

http://local.iteris.com/arc-it/
http://its.dot.gov/
https://www.itsa.org/technology-scan-assessments
https://www.etsi.org/technologies/
https://www.pcb.its.dot.gov/eprimer/default.aspx
https://www.ieee-itss.org/its-transactions

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Williams, B. (2008.). Intelligent Transport Systems Standards, Artech House, Boston, USA.	*10*	*40*

1.13. Quality Assurance

The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once a semester a survey is conducted among students.

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3.2. Course description

Generic information			
Head of Course	PhD Mirano Hess		
Course	Ship organization and management		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate study		
Type of Course	Optional course		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		3 + 0 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

To train students to understand and apply the procedures of organized teamwork, human resources management and on-board management in accordance with the latest maritime recommendations and

1.2. Prerequisites for Course Registration

/

1.3. Expected Learning Outcomes

1. Indicate, explain, and interpret procedures for conducting navigational watch
2. Define, explain and differentiate the factors that influence the planning and organization of teamwork
3. Describe, explain and compare elements of human resources management on board
4. Explain, separate and compare the influence of human and other factors on the awareness of the real situation and the decision-making process
5. Highlight and point out similarities and differences in the form of leadership

1.4. Course Outline

1. Organization of duties and allocation of crew responsibilities, ship master, keeping navigational watch
2. Keeping a port watch, general requirements for the crew of a ship
3. Human resources management, error chain, analysis and prevention, awareness of the real situation
4. Management and organization of work, relationship between team members, management and attitude, communication
5. International and national rules and recommendations, maritime organizations and institutions
6. Emergency and emergency preparedness, planning of work activities
7. Forms of leadership and teamwork, ability to perform work tasks, and workload management
8. Working knowledge of crew management and training
9. Knowledge and necessary ability to apply effective resource management and to apply decision-making methods
10. Correlation of human factor and marine accident, analysis of selected marine accident

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☒ Presentation
1.6. Comments		

1.7. Student Obligations

Active attendance at classes. Passed a midterm exam and final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation	0.3	Seminar paper		Experiment	
Written exam	0.5	Oral exam		Essay		Research	
Project		Continuous Assessment	0.7	Presentation		Practical work	
Portfolio							

[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% in class and 30% in final exam (according to the Regulations on studies of the University of Rijeka and the Regulations on study at the Faculty of Maritime Studies in Rijeka). Continuous assessment: a midterm exam, a minimum of 50% correct answers (I1, I2, I3) must be obtained, and a presentation of the subject for a maximum of 20% of credits in the course. Final exam: written exam in the course subject. A minimum of 50% correct answers should be obtained (I4, I5).
Examples of evaluating learning outcomes:

1. Explain what officers must agree on and what to consider when taking on navigational watch. (I1)
2. List and explain what factors a master must consider when organizing a navigational watch. (I2)
3. Compare and explain ways in which particular types of complacency affect the degradation of the team work and how to prevent them. (I3)
4. List the indicators of a decrease or loss of the situation awareness and explain ways in which we can maintain awareness. (I4)
5. Explain what a manager doing on the principle of situational leadership does. (I5)

1.10. Main Reading

Hess, M.: Ship organization and management, script on web pages of Faculty of Maritime Studies Univerity of Rijeka, 2020

1.11. Recommended Reading

1. Bridge Procedures Guide, ICS, 2016
2. Bridge Team Management, Nautical Institute, 2004
3. Maritime Law, RH
4. STCW Convention, IMO, 2010
5. Code of Safe Working Practices for Merchant Seafarers, TSO, 2018
6. ILO Document for Guidance, 1985
7. SOLAS Convention, IMO, 1974

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Hess, M.: Ship organization and management, script on web pages of Faculty of Maritime Studies Univerity of Rijeka, 2020	unlimited	70

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies University of Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.